Documentation for the 2005 Mobile National Emissions Inventory, Version 2

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ACRONYMS AND ABBREVIATIONS

AAMA	Alliance of Automobile Manufacturers of America
ALVW	adjusted loaded vehicle weight
ASOS	Automated Surface Observing System
AWOS	Automated Weather Observing System
BTS	Bureau of Transportation Statistics
CAP	criteria air pollutant
CASRN	Chemical Abstracts Service Registry Numbers
CNG	compressed natural gas
CO	carbon monoxide
DOE	Department of Energy
DOT	Department of Transportation
EC	elemental carbon
EDMS	Emissions and Dispersion and Modeling System
EGAS	Economic Growth Analysis System
EIG	Emission Inventory Group
EPA	U.S. Environmental Protection Agency
ERG	Eastern Research Group, Inc
ETBE	ethyl tertiary butyl ether
ETOH	ethanol
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FID	flame ionization detection
FIPS	Federal Information Processing System
GIS	geographic information system
GSE	ground support equipment
GUI	graphical user interface
GVWR	gross vehicle weight rating
HAPs	hazardous air pollutants
HC	hydrocarbons
HDDV	heavy duty diesel vehicle
HDGV	heavy duty gasoline vehicle
HHDDV	heavy heavy-duty vehicle
HPMS	Highway Performance Monitoring System
I/M	inspection and maintenance
LDDT	light duty diesel truck
LDGT	light duty gasoline truck
LDDV	light duty diesel vehicle
LDGV	light duty gasoline vehicle
LDV	light duty vehicle
LEV	low emission vehicle
LHDDV	light heavy-duty diesel vehicle
LPG	liquefied petroleum gas
LTO	landing and take-off
LVW	loaded vehicle weight
MC	motorcycle
MHDDV	medium heavy-duty diesel vehicle
mph	miles per hour
MTBE	methyl tertiary butyl ether

NAPAP	National Acid Precipitation Assessment Program
NCD	NMIM County Database
NCDC	National Climatic Data Center
NEI	National Emissions Inventory
NGV	natural gas vehicle
NH_3	ammonia
NIF	NEI Input Format
NMHC	nonmethane hydrocarbons
NMIM	National Mobile Inventory Model
NMOG	nonmethane organic gases
NO_x	oxides of nitrogen
NWS	National Weather Service
OC	organic carbon
OTAQ	Office of Transportation and Air Quality
PADDs	Petroleum Administration for Defense Districts
PAH	polyaromatic hydrocarbons
Pb	lead
Pechan	E.H. Pechan & Associates, Inc.
PM	particulate matter
PM10	particles with an aerodynamic diameter less than or equal to a nominal 10 micrometers
PM2.5	particles with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers
psi	pounds per square inch
QA	quality assurance
REMSAD	Regional Modeling System for Aerosols and Deposition
RFG	reformulated gasoline
RVP	Reid vapor pressure
SCC	source classification code
SEMCOG	South Eastern Michigan Council of Governments
SIC	standard industrial classification (code)
SIP	State implementation plan
S/L/T	State, local, and tribal
SO_2	sulfur dioxide
SO_4	sulfate
SOA	secondary organic aerosol
STEEM	Ship Traffic, Energy, and Environmental Model
TAME	tertiary amyl methyl ether
THC	total hydrocarbons
TOG	total organic gases
U.S.	United States
VOC	volatile organic compounds
VMT	vehicle miles traveled
WO	winter oxygenate

1.0 INTRODUCTION

The National Emissions Inventory (NEI) is a comprehensive inventory covering criteria pollutants and hazardous air pollutants (HAPs) for the 50 United States (U.S.), Washington DC, Puerto Rico, and U.S. Virgin Islands. The NEI was created by the U.S. Environmental Protection Agency's (EPA's) Emission Inventory Group (EIG) in Research Triangle Park, North Carolina.

The NEI will be used to support air quality modeling, rule development, international reporting, air quality trends analysis, and other activities. To this end, the EPA established a goal to compile comprehensive emissions data in the NEI for criteria and HAPs for nonroad mobile, onroad mobile, point, and nonpoint sources.

1.1 WHAT IS THE PURPOSE OF THIS REPORT?

This report summarizes the procedures EPA used to estimate annual emissions for the onroad mobile sector and a portion of the nonroad sector of EPA's 2005 final NEI, also referred to as the 2005 NEI Version 2. Relevant activities for preparing Version 1 of the mobile sector 2005 NEI are also summarized.

The nonroad sector is comprised of nonroad engines in EPA's NONROAD model, as well as other engines not modeled in NONROAD, including aircraft, commercial marine vessels, and locomotives. This report only addresses those nonroad categories included in EPA's NONROAD model. Methodologies for other nonroad categories are documented in a separate report entitled "Aircraft, Commercial Marine Vessel, and Locomotive, and Other Nonroad Components of the National Emissions Inventory" (ERG, 2005). For most of these source categories, EPA used the 2002 NEI Version 4 estimates. However, some of these estimates have been updated. Check the 2005 NEI website for the most recent information.

A summary of national annual onroad mobile and NONROAD model criteria pollutant emissions as calculated for the 2005 mobile NEI, Version 2 is provided in Table 1-1.

Table 1-1. 2005 Mobile National Emissions Inventory, Version 2

Pollutant	Onroad Emissions, tpy	NONROAD Emissions, tpy
VOC	4,194,811	2,826,714
NOx	6,386,627	2,051,998
CO	49,716,705	21,246,993
PM10-PRI	181,073	213,458
PM25-PRI	125,075	203,956
SO2	146,200	198,579
NH3	309,808	1,999

1.2 WHAT CATEGORIES ARE COVERED IN THIS REPORT?

The "onroad vehicles" category includes motorized vehicles that are normally operated on public roadways. This includes passenger cars, motorcycles, minivans, sport-utility vehicles, light-duty trucks, heavy-duty trucks, and buses.

NONROAD model categories include recreational marine and land-based vehicles, farm and construction machinery, industrial, commercial, logging, and lawn and garden equipment. Aircraft ground support equipment (GSE) and rail maintenance equipment are also included in NONROAD. These equipment are powered by compression-ignition engines, which are typically diesel-fueled, as well as spark-ignition or gasoline-fueled engines. Compressed natural gas (CNG) and liquefied petroleum gas (LPG) engines may also power certain types of nonroad equipment.

1.3 HOW IS THIS REPORT ORGANIZED?

Chapter 2 provides an overview of the procedures used to develop the 2005 nonroad and onroad mobile emission estimates, as well as a summary of methodologies used for developing historic year mobile emission estimates. Chapter 3 presents a discussion of EPA's National Mobile Inventory Model (NMIM), as well as a description of the inputs used in the NMIM County Database (NCD). Chapter 4 describes the procedures used to estimate mobile source refueling (i.e., Stage II) emission estimates.

The report also includes Appendix A, which contains a detailed listing of the local inputs used for the NCD as referenced in Chapter 3.

2.0 SUMMARY OF 2005 NONROAD AND ONROAD MOBILE METHODOLOGIES

This section provides an overview of the methods used to develop the 2005 NEI Versions 1 and 2. Though the focus of this documentation is on describing the methodologies and data used for 2005, section 2.1 of this document provides an overview of methodologies used for developing historic year mobile emission estimates, including onroad and all nonroad mobile categories.

2.1 WHAT ARE THE GENERAL METHODOLOGIES EPA USED TO DEVELOP PREVIOUS MOBILE NEIS?

Criteria air pollutant (CAP) emission estimates for mobile sources have been developed for the years 1970, 1975, and 1978 through 2002, and 2005. HAP emission estimates for mobile sources have been prepared for the years 1990, 1996, 1999, 2002, and 2005. Table 2-1a provides a summary of the methods used for preparing current base year (2005) and historic year HAP and CAP onroad mobile emission estimates. Table 2-1b lists the methods used to prepare various subsectors of the nonroad mobile sector inventory, for 2005 and previous inventory years.

2.2 WHAT IS THE BASIS FOR THE 2005 MOBILE NEI, VERSION 1?

EPA's Office of Transportation and Air Quality (OTAQ) has developed a model known as the NMIM. NMIM includes a county-level database with parameters specific to each county. The data in this county-level database are used to develop MOBILE6.2 and NONROAD model input files within NMIM. NMIM is described in more detail in Section 3.1 of this document. EPA's NMIM was used to generate both onroad and nonroad estimates for the 2005 NEI.

For the 2005 mobile NEI Version 1, NMIM was run for all counties. The NCD used is designated as NCD20070912. The version of the NMIM software was NMIM20070410. The MOBILE model version was M6203ChcOxFixNMIM. The NONROAD Model version was NR05c-BondBase. The basis for the 2005 default vehicle miles traveled (VMT) is data supplied by the Federal Highway Administration (FHWA), as well as publicly available data from FHWA's *Highway Statistics* series. Details of how the VMT database was developed are discussed in Section 3.2.2 of this report.

2.2.1 QA

NMIM has been tested to ensure that the MOBILE6 input files and NONROAD option ("opt") files it generates are correct, that it reads the NCD properly, and that its output files properly read and process the MOBILE6 and NONROAD output files. Both MOBILE6.2.03 and NONROAD2005 have been peer reviewed and publicly released.

Table 2-1a. Methods Used to Develop Emission Estimates for Onroad Vehicle Sources
(Years addressed in this report are noted in bold print)

Base Year(s)	Pollutant(s)	Geographic Area	Emission Estimation Method
2005	**All Criteria, HAPs**	**US, Puerto Rico, Virgin Islands**	**Emission estimates for all pollutants were developed using EPA's National Mobile Inventory Model (NMIM), which uses MOBILE6 to calculate onroad emission factors. Where States provided alternate onroad MOBILE6 inputs or VMT, these data replaced EPA default inputs. Default VMT is based on FHWA 2005 data and 2005 Census population estimates.**
2002	All Criteria, HAPs	US, Puerto Rico, Virgin Islands	Emission estimates for all pollutants were developed using EPA's National Mobile Inventory Model (NMIM), which uses MOBILE6 to calculate onroad emission factors. Where States provided alternate onroad MOBILE6 inputs or VMT, these data replaced EPA default inputs. California-supplied emissions data which replaced default EPA emission estimates for this state. Default VMT is based on FHWA 2002 data and population data from 2000 Census.
2001	VOC, NO_x, CO, SO_2, PM10, PM2.5	California	Emissions and VMT provided by California at county/vehicle type level; State-provided emissions expanded to county/SCC level by EPA
2001	NH_3	California	Calculated at State/county/SCC level by month using MOBILE6 emission factors with State-provided VMT data
2001	All Criteria	AL; CO; ME; MA; MS; OR; UT; VA; WV; Maricopa County, AZ; Hamilton County, TN	State-provided VMT grown to 2001; emissions calculated by EPA using MOBILE6 emission factors
2001	All Criteria	Rest of US	Calculated at State/county/SCC level by month using MOBILE6 and FHWA-based VMT
1999	All Criteria	AL; ME; MA; MS; UT; VA; WV; Maricopa County, AZ; Hamilton County, TN	Calculated at State/county/SCC level by month using MOBILE6; State-provided VMT data used
1999	VOC, NO_x, CO, SO_2, PM10, PM2.5	California	Emissions and VMT provided by California at county/vehicle type level; State-provided emissions expanded to county/SCC level by EPA
1999	NH_3	California	Calculated at State/county/SCC level by month using MOBILE6 emission factors with State-provided VMT data
1999	PM10 Exhaust	Colorado	PM10 emissions and VMT provided by State
1999	VOC, NO_x, CO, SO_2, PM10 brake and tire wear, PM2.5, NH_3	Colorado	Calculated at State/county/SCC level by month using MOBILE6; State-provided VMT data used

Table 2-1a. Methods Used to Develop Emission Estimates for Onroad Vehicle Sources
(Years addressed in this report are noted in bold print)

Base Year(s)	Pollutant(s)	Geographic Area	Emission Estimation Method
1999	All Criteria	Oregon	Emissions and VMT provided by Oregon at county/vehicle type level; State-provided emissions expanded to county/SCC level by EPA
1999	All Criteria	Rest of US, Puerto Rico, and US Virgin Islands	Calculated at State/county/SCC level by month using MOBILE6 and FHWA-based VMT
1999	HAPs	California	HAP emissions and VMT provided by California at county/vehicle type level; emissions allocated to SCC level by EPA
1999	HAPs	Rest of US, Puerto Rico, and US Virgin Islands	MOBILE6 emission factors calculated at State/county/SCC level by season; applied to FHWA-based VMT
1997-1998	All Criteria	US	2-step linear interpolation at State/count/SCC level based on 1996 and 1999 State/count/SCC level data
1990, 1996	HAPs	US	MOBILE6 emission factors calculated at State/county/SCC level by season; applied to Federal Highway Administration (FHWA)-based vehicle miles traveled (VMT)
1991-1995	All Criteria	US	Linear interpolation at State/count/SCC level based on 1990 and 1996 State/count/SCC level data
1988-1989	All Criteria	US	Linear interpolation at State/count/SCC level based on 1987 and 1990 State/count/SCC level data
1979-1986	All Criteria	US	Linear interpolation at State/count/SCC level based on 1978 and 1987 State/count/SCC level data
1978, 1987, 1990, 1996, 2000	All Criteria	US	Calculated at State/county/source classification code (SCC) level by month using MOBILE6, no State data incorporated
1970, 1975	All Criteria	US	Linear extrapolation at national vehicle type level based on 1978 and 1987 national data

Table 2-1b. Methods Used to Develop Annual Emission Estimates for Nonroad Mobile Sources

(Categories/years addressed in this report are noted in bold print)

Category	Base Year	Pollutant(s)	Estimation Method*
NONROAD Categories			
Nonroad Gasoline, Diesel, LPG, CNG	**2005**	**VOC, NO_x, CO, SO_2, PM10, PM2.5, NH_3, & HAPs**	**Emission estimates for NONROAD model engines were developed using EPA's National Mobile Inventory Model (NMIM), which incorporates NONROAD2005. Where States provided alternate nonroad inputs, these data replaced EPA default inputs.**
	2002	VOC, NO_x, CO, SO_2, PM10, PM2.5, NH_3, & HAPs	Emission estimates for NONROAD model engines were developed using EPA's National Mobile Inventory Model (NMIM), which incorporates NONROAD2005. Where States provided alternate nonroad inputs, these data replaced EPA default inputs. California-supplied emissions data also replaced EPA emission estimates for this State.
	1999	VOC, NO_x, CO, SO_2, PM10, PM2.5	Using emission estimates from two emission inventories including: 1) a 1996 county-level inventory, developed using EPA's October 2001 draft NONROAD model; and 2) an updated 1999 national inventory, based on EPA's draft Lockdown C NONROAD model (dated May 2002). Using the 1996 county-level emission estimates, seasonal and daily county-to-national ratios were then developed for application to updated national estimates per season estimated from the Lockdown C model. Replaced State-submitted data for California for all NONROAD model categories; Pennsylvania for recreational marine and aircraft ground support equipment, and Texas for select equipment categories.
	1996, 1997, 1998, 2000 & 2001	VOC, NO_x, CO, SO_2, PM10, PM2.5	Using emission estimates from two emission inventories including: 1) a 1996 county-level inventory, developed using EPA's October 2001 draft NONROAD model; and 2) updated year-specific national and California inventories, based on EPA's draft Lockdown C NONROAD model (dated May 2002). Using the 1996 county-level emission estimates, seasonal and daily county-to-national ratios and California county-to-State ratios were then developed for application to updated national estimates per season estimated from the Lockdown C model. California results replace the diesel equipment emissions generated from prior application of county-to-national ratios.
	1991-1995	VOC, NO_x, CO, SO_2, PM10, PM2.5, NH_3	Using 1990 and 1996 county-level emissions inventories, estimated emissions using linear interpolation of national emissions between 1990 and 1996. From these emissions, calculated the average annual growth rate for each pollutant/SCC combination for each year, and then applied the growth factors to 1990 county-level emissions to estimate 1991-1995 emissions.

Category	Base Year	Pollutant(s)	Estimation Method*
Nonroad Gasoline, Diesel, LPG, and CNG (Continued)	1990	VOC, NO_x, CO, SO_2, PM10, PM2.5	Using emission estimates from two emission inventories including: 1) a 1996 county-level inventory, developed using EPA's October 2001 draft NONROAD model; and 2) updated 1990 national inventory, based on EPA's draft Lockdown C NONROAD model (dated May 2002). Using the 1996 county-level emission estimates, seasonal and daily county-to-national ratios were then developed for application to updated national estimates per season estimated from the Lockdown C model.
	1986, 1988, & 1989	VOC, NO_x, CO, SO_2, PM10, PM2.5, NH_3	Using 1985 and 1990 county-level emissions inventories, estimated emissions using linear interpolation of national emissions between 1985 and 1990. From these emissions, calculated the average annual growth rate for each pollutant/SCC combination for each year, and then applied the growth factors to 1985 county-level emissions to estimate 1986-1989 emissions.
	1987	VOC, NO_x, CO, SO_2, PM10, PM2.5	Using EPA's draft Lockdown C NONROAD model (dated May 2002), developed updated national emissions for 1987 by running 4 seasonal NONROAD model runs to estimate annual criteria pollutant emissions. Also performed national NONROAD model runs to estimate typical summer weekday emissions.
	1985	VOC, NO_x, CO, SO_2, PM10, PM2.5	Using emission estimates from two emission inventories including: 1) a 1996 county-level inventory, developed using EPA's October 2001 draft NONROAD model; and 2) updated 1985 national inventory, based on EPA's draft Lockdown C NONROAD model (dated May 2002). Using the 1996 county-level emission estimates, seasonal and daily county-to-national ratios were then developed for application to updated national estimates per season estimated from the Lockdown C model.
	1970, 1975, 1978, & 1980	VOC, NO_x, CO, SO_2, PM10, PM2.5	Using EPA's draft Lockdown C NONROAD model (dated May 2002), developed updated national emissions for all years by running 4 seasonal NONROAD model runs to estimate annual criteria pollutant emissions. Also performed national NONROAD model runs to estimate typical summer weekday emissions.
	1996, 1997, 1998, 1999, 2000, & 2001	NH_3	Obtaining national fuel consumption estimates from the Lockdown C NONROAD model, multiplying by NH_3 emission factors, and distributing to counties using 1996 inventory, based on October 2001 draft NONROAD. NH_3 emissions for California were also recalculated using updated diesel fuel consumption values generated for California-specific runs, and assuming the 1996 county-level distribution.
	1985 & 1990	NH_3	Obtaining national fuel consumption estimates from the Lockdown C NONROAD model, multiplying by NH_3 emission factors, and distributing to counties using 1996 inventory, based on October 2001 draft NONROAD.

Category	Base Year	Pollutant(s)	Estimation Method*
Nonroad Gasoline, Diesel, LPG, and CNG (Continued)	1987	NH_3	Obtaining 1987 national fuel consumption estimates from Lockdown C NONROAD model and multiplying by NH_3 emission factors.
	1970, 1975, 1978, & 1980	NH_3	Obtaining national fuel consumption estimates from the Lockdown C NONROAD model and multiplying by NH_3 emission factors.
	1990, 1996, & 1999	HAPs	Speciation profiles applied to county VOC and PM estimates. Metal HAPs were calculated using fuel and activity-based emission factors. Some State data were provided and replaced national estimates. (2003)
Aircraft			
Commercial Aircraft	2002 & 2005	Criteria and HAPs	Federal Aviation Administration (FAA) Emissions and Dispersion and Modeling System (EDMS) was run for criteria pollutants, VOC and PM emissions were speciated into HAP components. (2004)
	1990, 1996, 1999, 2000, 2001	VOC, NO_x, CO, SO_X	Input landing and take-off (LTO) data into FAA EDMS. National emissions were assigned to airports based on airport specific LTO data and Bureau of Transportation Statistics (BTS) geographic information system (GIS) data. State data replaced national estimates. (2003)
	1970-1998	VOC, NO_x, CO, SO_X	Estimated emissions for interim years using linear interpolation between available base years. (2003)
	1990, 1996, 1999	HAPs	Speciation profiles were applied to VOC estimates to get national HAP estimates. State data replaced national estimates. (2003)
General Aviation, Air Taxis	1978, 1987, 1990, 1996, 1999, 2000, 2001, & 2002	VOC, NO_x, CO, SO_2, PM10, PM2.5	Used FAA LTO data and EPA approved emission factors for criteria estimates. Speciation profiles were applied to VOC estimates to get national HAP estimates. State data replaced national estimates. (2004)
	1970-1998	VOC, NO_x, CO, SO_X, PM10, PM2.5	Estimated emissions for interim years using linear interpolation between available base years. (2003)
	1990, 1996, 1999, & 2002	HAPs	Used FAA LTO data and EPA approved emission factors for criteria estimates. Speciation profiles were applied to VOC estimates to develop national HAP estimates. (2004)
	1990, 1996, 1999, & 2002	Pb	Used Department of Energy (DOE) aviation gasoline usage data with lead concentration of aviation gasoline. (2004)
	1996	NH_3	Applied NH_3 emissions factors to 1996 national jet fuel and aviation gasoline consumption estimates.
Military Aircraft	1978, 1987, 1990, 1996, 1999, 2000, 2001, & 2002	VOC, NO_x, CO, SO_2, PM10, PM2.5	Used FAA LTO data and EPA approved emission factors for criteria estimates. Representative HAP profiles were not readily available, therefore HAP estimates were not developed. State data replaced national estimates. (2004)
	1970-1998	VOC, NO_x, CO, SO_X, PM10, PM2.5	Estimated emissions for interim years using linear interpolation between available base years. (2003)

Category	Base Year	Pollutant(s)	Estimation Method*
Auxiliary Power Units	1985-2001	VOC, NO_x, CO, SO_2, PM10, PM2.5	Grew 1996 emissions to each year using LTO operations data from the FAA. Estimation methods prior to 1996 reported in EPA, 1998.
Unpaved Airstrips[1]	1985-2001	PM10, PM2.5	Grew 1996 emissions to each year using SIC 45-Air Transportation growth factors, consistent with the current draft version of Economic Growth Analysis System (EGAS). Estimation methods prior to 1996 reported in EPA, 1998.
Aircraft Refueling[1]	1985-2001	VOC	Grew 1996 emissions to each year using SIC 45-Air Transportation growth factors, consistent with the current draft version of EGAS. Estimation methods prior to 1996 reported in EPA, 1998.
Commercial Marine Vessel (CMV)			
CMV Steam/Residual fuel Categories	2005	VOC, NO_x, CO, SO_2, PM10, PM2.5, HAPs	2002 Estimates grown to 2005 (2008).
CMV Steam/Residual fuel Categories	2002	VOC, NO_x, CO, SO_2, PM10, PM2.5, HAPs	2002 based estimates were developed for port and underway category 3 (C3) vessels as part of a rulemaking effort. Emissions were developed separately for near port and underway emissions. For near port emissions, inventories for 2002 were developed for 89 deep water and 28 Great Lake ports in the U.S. The Waterway Network Ship Traffic, Energy, and Environmental Model (STEEM) was used to provide emissions from ships traveling in shipping lanes between and near individual ports (2008)
CMV Diesel Categories	2002 & 2005	VOC, NO_x, CO, SO_2, PM10, PM2.5	2001 Estimates carried over. Used State data when provided. (2004)
		HAPs	1999 Estimates carried over. Used State data when provided. (2004)
CMV Diesel	1978, 1987, 1990, 1996, 1999, 2000, & 2001	VOC, NO_x, CO, SO_x, PM10, & PM2.5,	Used criteria emission estimates in the background document for marine diesel regulations for 2000. Adjusted 2000 criteria emission estimates for other used based on fuel usage. Emissions were disaggregated into port traffic and underway activities. Port emissions were assigned to specific ports based on amount of cargo handled. Underway emissions were allocated based on Army Corp of Engineering waterway data. State data replaced national estimates. (2003)
	1970-1998	VOC, NO_x, CO, SO_X, PM10, PM2.5	Estimated emissions for interim years using linear interpolation between available base years. (2003)
	1990, 1996, 1999	HAPs	VOC and PM emission estimates were speciated into HAP components. State data replaced national estimates. (2003)
	1996	NH_3	Applied NH_3 emissions factors to 1996 distillate and residual fuel oil estimates (i.e., as reported in EIA, 1996).
	1990-1995	NH_3	Estimation methods reported in EPA, 1998.

Category	Base Year	Pollutant(s)	Estimation Method*
CMV Steam Powered	1978, 1987, 1990, 1996, 1999, 2000, & 2001	VOC, NO_x, CO, SO_x, PM10, & PM2.5	Calculated criteria emissions based on EPA State implementation plan (SIP) guidance. Emissions were disaggregated into port traffic and under way activities. Port emissions were assigned to specific ports based on amount of cargo handled. Underway emissions were allocated based on Army Corp of Engineering waterway data. State data replaced national estimates. (2003)
	1970-1998	VOC, NO_x, CO, SO_X, PM10, PM2.5	Estimated emissions for interim years using linear interpolation between available base years. (2003)
	1990, 1996, & 1999	HAPs	VOC and PM emission estimates were speciated into HAP components. State data replaced national estimates. (2003)
Military Marine	1997-2001	VOC, NO_x, CO, SO_2, PM10, PM2.5	Applied EGAS growth factors to 1996 emissions estimates for this category.
CMV Coal,[2] CMV, Steam powered, CMV Gasoline[2]	1997-1998	VOC, NO_x, CO, SO_2, PM10, PM2.5	Applied EGAS growth factors to 1996 emissions estimates for this category.
CM Coal, CMV, Steam powered, CMV Gasoline, Military Marine	1991-1995	VOC, NO_x, CO, SO_2, PM10, PM2.5	Estimation methods reported in EPA, 1998.
Locomotives			
Class I, Class II, Commuter, Passenger, and Yard Locomotives	1978, 1987, 1990, 1996, 1999, 2000, 2000, 2002, & 2005	VOC, NO_x, CO, PM10, PM2.5	Criteria pollutants were estimated by using locomotive fuel use data from DOE EIA and available emission factors. County-level estimates were obtained by scaling the national estimates with the rail GIS data from the Department of Transportation (DOT). State data replaced national estimates. (2004)
	1978, 1987, 1990, 1996, 1999, 2000, 2001, 2002, & 2005	SO_2	SO_x emissions were calculated by using locomotive fuel use and fuel sulfur concentration data from EIA. County-level estimates were obtained by scaling the national estimates with the county level rail activity data from DOT. State data replaced national estimates. (2004)
	1970-1998	VOC, NO_x, CO, SO_X, PM10, PM2.5	Estimated emissions for interim years using linear interpolation between available base years. (2003)
	1990, 1996, 1999, & 2002	HAPs	HAP emissions were calculated by applying speciation profiles to VOC and PM estimates. County-level estimates were obtained by scaling the national estimates with the county level rail activity from DOT. State data replaced national estimates. (2004)
	1997-1998	NH_3	Grew 1996 base year emissions using EGAS growth indicators.
	1996	NH_3	Applied NH_3 emissions factors to diesel consumption estimates for 1996.
	1990-1995	NH_3	Estimation methods reported in EPA, 1998.

Notes:
*Dates included at the end of Estimation Method represent the year that the section was revised.
1. Emission estimates for unpaved airstrips and aircraft refueling are included in the area source NEI, since they represent non-engine emissions.
2. National Emission estimates for CMV Coal and CMV Gasoline were not developed though States and local agencies may have submitted estimates for these source categories.

EPA, 1998. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Emission Factors and Inventory Group, *National Air Pollutant Emission Trends, Procedures Document*, 1900–1996, EPA-454/R-98-008. May 1998.

The NCD has been undergoing review ever since it was developed. The database was assembled by Eastern Research Group under contract to OTAQ and included significant QA effort, as documented in "National Mobile Inventory Model (NMIM) Base and Future Year County Database Documentation and Quality Assurance Procedures" (EPA, 2003a). The NCD was subsequently quality checked by E.H. Pechan & Associates, Inc. (Pechan) under contract to OTAQ, as documented in "Comparison of NMIM County Database to NEI Modeling, Final Report" (EPA, 2003b). States most recently reviewed the data in the NCD posted for 2005 NEI Version 1 and provided corrections, which have been incorporated into the database. For more information on the NCD, see Section 3.2.

Finally, EPA performed completeness checks to confirm that data for all county-month combinations were generated by the NMIM run. Since the NMIM MOBILE6 runs and NMIM NONROAD runs are always executed in county-month combinations, the presence in the output data of all county-month combinations indicates that all MOBILE6 and NONROAD runs completed and that NMIM processed them.

2.3 HOW HAVE 2005 MOBILE EMISSION ESTIMATES CHANGED FROM THE 2005 MOBILE NEI, VERSION 1?

This section provides an overview of the basis of the 2005 mobile NEI, Version 2. The basis for some of the differences seen from the 2005 mobile NEI, Version 1 is also discussed.

2.3.1 Basis for 2005 Mobile NEI, Version 2

In developing the 2005 mobile NEI, Version 2, EPA provided State, local, and tribal (S/L/T) agencies the opportunity to review and provide comment on the NMIM county-level database for 2005. The 2005 NMIM county database was populated with EPA's most current default 2005 data. In addition, for some of the onroad and nonroad activity inputs, the 2005 NCD contained data submitted by States for the 2002 NEI. EPA prepared instructions for S/L/T agencies to explain the preferred methods for submitting revised NMIM inputs (EPA, 2007a). EPA requested that air agencies submit revised data to EPA by September 30, 2007. Once submitted, these data were logged, reviewed, and quality-assured by EPA. Table 2-2 provides a summary of the data submitted by S/L/T agencies for the 2005 Mobile NEI. As seen in Table 2-2, many States also provided VMT data in the NEI Input Format (NIF (reported as throughput in the PE table)). These VMT were converted to the NCD VMT format and replaced the default EPA estimates.

For the 2005 mobile NEI Version 2, NMIM was run for all counties. Emission estimates for the 2005 onroad and NONROAD model (hereafter referred to as simply "nonroad") NEI Version 2 were made using NMIM and the updated NCD. The NMIM county-level database for 2005 was updated with local data submitted by State and local agencies and EPA's most current default data where local data were not provided. The NCD used is designated as NCD20080522, which includes the data provided by the States after they reviewed EPA's default 2005 NCD. State-specific files that correspond to the updated NCD are posted at EPA's web site at: http://www.epa.gov/ttn/chief/net/2005inventory.html. The version of the NMIM software was

Table 2-2. Summary of Onroad and Nonroad 2002 and 2005 NMIM Data Submissions

State ID		State Name	Data Provided For	2002 NCD Files	2002 MOBILE6 Input Files	2002 NONROAD/NMIM External Files	2005 NCD Files	2005 Onroad NIF VMT
01	AL	Alabama	All Counties					
02	AK	Alaska						
04	AZ	Arizona	Maricopa County				✓	
			Pima County		✓			
			Rest of State					
05	AR	Arkansas	All Counties					
06	CA	California	All Counties					✓
			La Posta Tribe					
08	CO	Colorado	All Counties	✓		✓	✓	
09	CT	Connecticut						
10	DE	Delaware	All Counties	✓		✓		✓
11	DC	District of Columbia		✓	✓		✓	
12	FL	Florida	Pinnelas County					
			Broward County Rest of State					
13	GA	Georgia	All Counties					✓
15	HI	Hawaii						✓
16	ID	Idaho	All Counties		✓			✓
17	IL	Illinois	All Counties		✓	✓ (opt files only)		
18	IN	Indiana				✓		
19	IA	Iowa	All Counties					
20	KS	Kansas	All Counties					
21	KY	Kentucky	Jefferson County		✓			
			Rest of State					
22	LA	Louisiana	All Counties					
23	ME	Maine	All Counties				✓	
24	MD	Maryland	All Counties	✓	✓		✓	✓
25	MA	Massachusetts	All Counties		✓			
26	MI	Michigan	All Counties		✓	✓	✓	
			SEMCOG	✓	✓		✓	
27	MN	Minnesota	All Counties					
28	MS	Mississippi	All Counties					
29	MO	Missouri	All Counties					
30	MT	Montana						
31	NE	Nebraska	Lancaster County					
			Rest of State					

Table 2-2. Summary of Onroad and Nonroad 2002 and 2005 NMIM Data Submissions

State ID		State Name	Data Provided For	2002 NCD Files	2002 MOBILE6 Input Files	2002 NONROAD/NMIM External Files	2005 NCD Files	2005 Onroad NIF VMT
32	NV	Nevada	15 of 17 Counties					✓
			Clark County					
			Washoe County					
33	NH	New Hampshire	All Counties					
34	NJ	New Jersey	All Counties	✓	✓			
35	NM	New Mexico						
36	NY	New York	All Counties		✓			
37	NC	North Carolina	All Counties				✓	
38	ND	North Dakota						
39	OH	Ohio	All Counties		✓	✓		
40	OK	Oklahoma						
41	OR	Oregon	All Counties		✓			
42	PA	Pennsylvania	All Counties					✓
72	PR	Puerto Rico						
44	RI	Rhode Island				✓		
45	SC	South Carolina					✓	
46	SD	South Dakota						
47	TN	Tennessee	91 of 95 Counties		✓	✓ (opt files only)		✓
			Davidson County	✓	✓	✓ (opt files only)		✓
			Hamilton County		✓			✓
			Knox County		✓			✓
			Shelby County		✓			✓
48	TX	Texas	All Counties		✓			✓
49	UT	Utah	All Counties	✓	✓		✓	
50	VT	Vermont	All Counties		✓			
78	VI	Virgin Islands						
51	VA	Virginia	All Counties	✓			✓	
53	WA	Washington	All Counties	✓		✓		
54	WV	West Virginia	All Counties					✓
55	WI	Wisconsin	All Counties		✓	✓	✓	
56	WY	Wyoming						

NMIM20071009. The MOBILE model version was M6203ChcOxFixNMIM. The NONROAD Model version was NR05c-BondBase.

A detailed listing by parameter of S/L/T inputs used in the updated NCD for the 2005 NEI Version 2 is presented in Chapter 3, Section 3.2 of this document. State data related to temperature and onroad or nonroad fuel profiles are described in detail in Sections 3.2.3 and 3.2.4. State-submitted data related to onroad control programs and activity data used for the onroad/NMIM runs are described in detail in Sections 3.2.6 and 3.2.7, respectively. The specific State-submitted data related to nonroad activity parameters used for the NONROAD/NMIM runs are described in detail in Section 3.2.5.

In cases where S/L/T agencies provided NIF data, including the PE table where VMT data are stored, the NIF VMT data were converted to the NMIM BaseYearVMT table format. The NCD was then updated with these VMT data before it was run. The conversion from the NIF to NMIM VMT formats was performed in the manner discussed in Section 3.2.2 of this document for VMT provided at the 12 vehicle type level of detail and then expanded to the 28 vehicle type level of detail.

2.3.2 QA

Prior to performing the NMIM runs, EPA quality assured all updates made to the NCD. EPA coordinated with State and local agencies where needed to follow-up on questions regarding the accuracy or reasonableness of data submitted.

EPA also performed completeness checks to confirm that data for all county-month combinations were generated by the NMIM run. Since the NMIM MOBILE6 runs and NMIM NONROAD runs are always executed in county-month combinations, the presence in the output data of all county-month combinations indicates that all MOBILE6 and NONROAD runs completed and that NMIM processed them.

2.3.3 Onroad Mobile Pollutant Emission Comparisons

For the onroad sources, the primary differences between Version 1 and Version 2 of the 2005 NEI estimates stem primarily from changes in the default VMT, as well as S/L/T-provided MOBILE6 activity inputs. Table 2-3 summarizes the differences in criteria pollutant emissions and VMT between these two versions of the NEI for the entire United States, Puerto Rico, and the Virgin Islands. At the national level, the changes are relatively consistent among all criteria pollutants, and generally follow the trend reflected in the overall change in VMT. SO_2 emission estimates show a slightly smaller increase of 0.8 percent, as these increases in VMT are likely offset by decreases in sulfur content for States that provided these data.

Table 2-3. Comparison of 2005 Onroad Mobile NEI, Version 1 and Version 2

	Version 1 2005 NEI, tpy	Version 2 2005 NEI, tpy	Percent Difference
VOC	4,128,884	4,194,811	1.6%
NOX	6,294,227	6,386,627	1.4%
CO	49,035,793	49,716,705	1.4%
PM10-PRI	178,628	181,073	1.3%
PM25-PRI	123,439	125,075	1.3%
SO2	145,020	146,200	0.8%
NH3	305,486	309,808	1.4%
VMT (million miles)	2,982,132	3,026,525	1.5%

The annual VMT used in the 2005 NEI Version 1 was based on developing a default 2005 VMT database from FHWA data and then replacing the FHWA-based VMT with State-based VMT grown to 2005 for States and local areas that supplied VMT data used in the 2002 NEI. In developing Version 2 of the 2005 NEI, these default 2005 VMT data were then replaced by 2005-specific State data where these data were supplied to EPA. The resulting change in VMT for the entire inventory is about a 1.4 percent increase from Version 1 to Version 2 of the 2005 NEI. However, at the State level, the VMT changes range from a 16 percent decrease from Version 1 to Version 2 in Idaho to an increase in VMT of 12 percent in California. In addition, there have also been changes made to many of the MOBILE6 input values to reflect data submitted by individual S/L/T agencies (see Chapter 3). These include inputs such as vehicle distributions by age, speeds, and I/M program specifications. Changes in any of these inputs can cause changes in the resulting emission values.

2.3.4 NONROAD Model Pollutant Emission Comparisons

For the nonroad sector, the small differences observed between Versions 1 and 2 of the 2005 NEI are due to NMIM inputs submitted by State and local agencies that impact nonroad emissions. These include primarily fuel parameter and temperature data. Table 2-4 summarizes the differences in NONROAD model criteria pollutant emissions between Version 1 and 2 of the 2005 NEI for the entire US, Puerto Rico, and the Virgin Islands. At the national level, the changes are relatively small, with VOC showing the largest difference. When comparing emissions at a State level, emissions changed notably for those 5 States submitting nonroad-related inputs, including Maine, Maryland, Michigan, Utah, and Wisconsin.

EPA also observed minor differences between nonroad evaporative VOC emission estimates for States for which no updates were made. These differences were determined to be caused by an update to a NONROAD data input file (spillage.emf) that specifies tank sizes, hose lengths, and ethanol permeation factors.

Table 2-4. Comparison of 2005 NONROAD Model NEI, Version 1 and Version 2

	Version 1 2005 NEI, tpy	Version 2 2005 NEI, tpy	Percent Difference
VOC	2,843,321	2,826,714	-0.6%
NOX	2,049,258	2,051,998	0.1%
CO	21,232,257	21,246,993	0.1%
PM10-PRI	213,483	213,458	0.0%
PM25-PRI	203,971	203,956	0.0%
SO2	198,018	198,579	0.3%
NH3	1,998	1,999	0.0%

3.0 NMIM

3.1 NMIM METHODOLOGY

3.1.1 Introduction and Overview

EPA's NMIM is a consolidated emissions modeling system for EPA's MOBILE6 and NONROAD models. It was developed to produce, in a consistent and automated way, national, county-level mobile source emissions inventories for the NEI and for EPA rulemaking. When national inventories have previously been constructed from MOBILE6 and NONROAD, the necessary input data have been widely scattered in disparate formats and have required additional specialized software to convert these data into input files for MOBILE6 and NONROAD, to run the models, to integrate the results into a final inventory, and to post-process the results into forms suitable for the national inventories. NMIM is designed to accomplish all of these tasks in a single package.

NMIM comprises a Java framework, graphical and command line user interfaces, the MOBILE6 and NONROAD models, a national county database, and postprocessing and aggregation capabilities. NMIM's primary improvements over MOBILE6 and NONROAD are: 1) the inclusion of all the required county data for the nation in a single database; 2) graphical user interface (GUI); 3) "shortcuts" for generating national inventories; 4) tools for aggregation and post-processing; 5) estimation of 33 HAPs and 17 dioxin/furan congeners by ratio to various MOBILE6 and NONROAD output parameters; and 6) distributed processing capability to enhance performance. NMIM specifically extends MOBILE6's capabilities by producing inventories rather than just emissions factors. NMIM provides consistency across both models and all pollutants by using a single input database for MOBILE6 and NONROAD and for criteria pollutants and HAPs.

An installation package and users manual for NMIM 2005 may be downloaded from the website: http://www.epa.gov/otaq/nmim.htm. Questions about NMIM can be emailed to mobile@epa.gov.

This chapter begins with an overall explanation of how NMIM works, followed by the details of how it runs MOBILE6 and NONROAD. Next, it discusses the pollutant and source category inventories available from running NMIM. Then it describes the NCD and plans for updating and improving it through the NEI process. Lastly, there is an explanation of how NMIM estimates various HAPs that are not direct outputs of MOBILE6 and NONROAD.

3.1.2 How NMIM Works

The NMIM user specifies a set of years and months, a geographic region (the whole United States, any combination of whole States, or any combination of particular counties, including Puerto Rico and the Virgin Islands), a set of pollutants, and categories of onroad vehicles and nonroad equipment. This collection of user requests is called a "run specification" or RunSpec, and can be saved in a file for later execution or for text editing. RunSpecs can be produced by the NMIM GUI or by using a text editor. NMIM RunSpecs can be executed from the GUI or from the command line.

Based on the RunSpec and information in the NCD, NMIM writes input files for the MOBILE6 and NONROAD models. NMIM then runs these models, reads their output files, performs additional processing if necessary, and puts the inventories into an output database. Additional processing includes multiplying MOBILE6 emission factors by VMT and estimating emissions of some other pollutants (see below) as ratios to pollutant inventories generated by MOBILE6 and NONROAD. NMIM also has post-processing capability that can be applied after the inventory is generated, including the option to produce NIF Version 3.0 (NIF3) files.

NMIM employs two main techniques, adopted from previous NEIs, to make the production of national inventories tractable. The first is to assume that monthly time resolution is adequate for both meteorology and source activity and therefore to perform 12 monthly runs instead of 365 daily runs. NMIM is designed to do only monthly runs and produces annual inventories by summing the 12 monthly inventories.

The second technique, which was not used for the 2005 NEI, is to group similar counties, allowing NMIM to do a single MOBILE6 or NONROAD run for the entire group. All counties were run individually for this version of the 2005 NEI to make maximum use of county-specific information.

As a way of further improving performance, NMIM may be run in a distributed-processing mode, employing multiple computers. NMIM comprises two programs, Master and Worker. Both Master and Worker(s) have a simple text configuration file which specifies the path to a shared folder through which they communicate. The GUI, used to produce RunSpecs and AgSpecs as discussed above, is on the Master. In standalone mode, one Master, one Worker, and the shared folder are on the same computer. In distributed mode, there are multiple workers on separate computers. For both Version 1 and Version 2 of the 2005 NEI, NMIM was run in distributed mode, using one master and several workers.

3.1.3 How NMIM Runs Mobile6

NMIM writes a MOBILE6 input file and executes MOBILE6 once for each month for each representing county (if the user chose the Geographic Representation option "County Group") or for each county (if the user chose the Geographic Representation option "County"). The resulting emission factors are multiplied by the VMT for each county. Each MOBILE6 input file is constructed using data obtained from the NCD.

The MOBILE6 input files constructed by NMIM are designed to accommodate detailed user input and to use a consistent set of commands. In order to use consistent fuels data for all pollutants, the AIR TOXICS command is always used, even if no air toxics are requested by the user. To enable the AIR TOXICS command, NMIM always inserts the command to model acrolein in the MOBILE6 input file, whether the user requests it or not. However, if the user does not request acrolein, it will not appear in the output table. Similarly, other commands, such as ALTITUDE, POLLUTANTS, and EVALUATION MONTH are always explicitly used, rather than depending on MOBILE6 default settings and will always appear in NMIM MOBILE6 input files. The NMIM MOBILE6 input files always use the HOURLY TEMPERATURES command, rather than MIN/MAX TEMPERATURE command. The hourly RELATIVE HUMIDITY command is always used, rather than the ABSOLUTE HUMIDITY command. The BAROMETRIC PRES command is always used, since this value interacts with the relative humidity values. Average speed distributions are always specified using the SPEED VMT command, rather than the AVERAGE SPEED command.

For consistency, NMIM requires that gasoline fuel parameters have the level of detail to properly model air toxic emissions, even though less detail is required to model criteria pollutants. The OXYGENATE command is used instead of the OXYGENATED FUELS command, so all oxygen content values must be expressed as volume percent instead of weight percent. GAS AROMATIC%, GAS OLEFIN%, GAS BENZENE%, E200 and E300 must always be specified. RVP OXY WAIVER command is always set to 1 (no waiver), because Reid vapor pressure (RVP) values from the fuel surveys are assumed to already account for any RVP effect from oxygenated fuels. The FUEL RVP command is always required. The GASOLINE SULFUR command and FUEL PROGRAM command Option 4 are always used to explicitly set the sulfur content of gasoline. The same gasoline sulfur content is used for both commands and for all years in the FUEL PROGRAM command, although it would normally have different sulfur values for different years. Each MOBILE6 run covers only a single month in a particular calendar year, so NMIM sets all possible sulfur values the same to avoid programming logic to determine which of the possible years to change.

Some counties have local emission control programs. The basic information for these programs is stored in the NCD and used to create the appropriate commands for the input file when needed. Inspection and maintenance (I/M) programs for counties are stored in external data files and accessed using the I/M DESC FILE command.

In addition to the basic required information, NMIM can also include county specific data that is normally provided to MOBILE6 using external data files. Nearly any of the valid MOBILE6 commands can be used, including commands used to model local Low Emission Vehicle (LEV) phase-in programs and local natural gas vehicle fractions. Diesel sales fractions are stored in an external file and used to create the appropriate input command.

Not all MOBILE6 commands are used by NMIM. The VMT FRACTIONS and VMT BY FACILITY commands are not needed, since these commands are only needed to create composite emission rates. NMIM converts all emission rate results from MOBILE6 to tons using the county specific VMT for each vehicle class and roadway type. Since all gasolines are explicitly defined, both the SEASON command and FUEL PROGRAM command Option 2 are never used.

Only weekdays are modeled by NMIM. Commands that apply to weekend variations are not used. This simplification makes sense because most weekend differences in MOBILE6 are temporal distributions, so MOBILE6's emission factors at the day level are little affected by these differences. (Parameters that can differ between weekends and weekdays are hot soak duration distribution, start distribution, starts/day, soak distribution, and trip length distribution.) The major difference between weekdays and weekends is VMT, which is provided by month, vehicle type, and roadway type in the NCD.

MOBILE6 has only 4 facility or roadway types: freeways, arterials, ramps, and locals. Ramp speed is fixed at 34.6 miles per hour (mph) and local speed at 12.9 mph. Distributions of average speeds are specified separately for freeways and arterials using the SPEED VMT command. If only a single MOBILE6 scenario were run, the same distribution of average speeds would be applied to all vehicle types. Separate specification of average speed distributions for all combinations of the 12 roadway types and all 28 MOBILE6 vehicle types would require running 168 MOBILE6 scenarios.

In order to avoid running so many MOBILE6 scenarios, while retaining reasonable flexibility, NMIM groups vehicle class-roadway type combinations into 18 groups, shown in Table 3-1. These groups are those that have been used in past NEI base years, and provide flexibility in assigning average speeds while limiting the number of MOBILE6 runs necessary to generate an inventory. Since nine of these combinations use the MOBILE6 freeway facility type and 9 use the arterial facility type, a total of 9 MOBILE6 scenarios are needed to model the 18 vehicle class/roadway type combinations. Average speed distributions for each of these 18 vehicle class/roadway type combinations can be specified for each county.

Because MOBILE6 can model only one particle size at a time, if both PM10 and PM2.5 are desired, NMIM runs a tenth MOBILE6 scenario to obtain emission factors for the extra particle size. MOBILE6 separates exhaust particulates into sulfate (SO_4), organic carbon (OC), elemental carbon (EC), lead, tire wear, and brake wear. Of these, only SO_4 depends on speed. If either PM10 or PM2.5 is requested, the results are obtained from the standard nine scenarios. If both PM10 and PM2.5 are requested, the nine scenarios are run for PM10. Since all SO_4 is PM2.5, if both PM10 and PM2.5 are requested, the SO_4 emission factor for both is taken from the nine scenarios that are sensitive to speed, and the tenth scenario is used to obtain the emission factors for all the other PM2.5 components.

Table 3-1. The 18 Vehicle Class-roadway Type Combinations in NMIM

*M6Vtypes**	*Road Types*	*M6 Ftype*
LDV	Rural Interstate	Freeway
LDT	Rural Interstate	Freeway
HDV	Rural Interstate	Freeway
LDV	Urban Interstate	Freeway
LDT	Urban Interstate	Freeway
HDV	Urban Interstate	Freeway
LDV	Urban Freeways & Expressways	Freeway
LDT	Urban Freeways & Expressways	Freeway
HDV	Urban Freeways & Expressways	Freeway
LDV,LDT	Rural Principal Arterial	Arterial
LDV,LDT	Rural Minor Arterial	Arterial
HDV	Rural Principal Arterial	Arterial
LDV,LDT	Rural Major Collector	Arterial
LDV,LDT	Rural Minor Collector, Rural Local	Arterial
HDV	Rural Minor Arterial	Arterial
LDV,LDT	Urban Principal Arterial, Urban Minor Arterial, Urban Collector	Arterial
HDV	Rural Major Collector, Rural Minor Collector, Rural Local	Arterial
HDV	Urban Principal Arterial, Urban Minor Arterial, Urban Collector	Arterial

* Reference MOBILE6.2 User Guide, Appendix B
LDV = MOBILE6 Vehicle Types 1 and 16.
LDT = MOBILE6 Vehicle Types 2-5.
HDV = MOBILE6 Vehicle Types 6-15.

MOBILE6 specifies a calendar year and an evaluation month of either January or July. This combination determines the fleet composition for which emission factors are generated. For each month of a given inventory year, NMIM writes the MOBILE6 input file using the combination of calendar year and evaluation month shown in Table 3-2.

The reasoning behind this scheme is that the fleet composition in October, November, and December of year Y is more like that of January of year Y+1 than it is like July of year Y. This scheme does not cause a problem with fuel properties, because NMIM always looks up the fuel properties in the NCD for the inventory year and month being modeled. Control programs in MOBILE6 are always assumed to begin on January 1, but MOBILE6 assumes that these programs have no effect on that day, since the program has had no time to get started. Hence NMIM is not erroneously introducing next year's control programs by modeling October, November, and December as January 1 of the following year.

Table 3-2. The MOBILE6 Calendar Years and Evaluation Months That Are Used by NMIM to Produce an Inventory for Each Month of a Given Year, *Y*

NMIM Month of Inventory Year Y	*MOBILE6 Calendar Year*	*MOBILE6 Evaluation Month*
1	Y	1
2	Y	1
3	Y	1
4	Y	7
5	Y	7
6	Y	7
7	Y	7
8	Y	7
9	Y	7
10	Y+1	1
11	Y+1	1
12	Y+1	1

3.1.4 How NMIM Runs NONROAD

NONROAD estimates monthly fuel consumption and emissions of total hydrocarbons (THC), CO, NO_x, SO_2, and PM. Additional pollutants are produced by NMIM as ratios to some of these outputs.

The NONROAD Model reads a set of ASCII instructions, known as an "opt file" (for options). NMIM creates this file from data in the NCD. As employed in NMIM, the opt file is limited to one State and specifies month and year, fuel properties, temperature, and the counties for which to calculate emissions, which may be all or a subset of the counties in the State. NONROAD internally produces emissions for the whole State and then allocates the emissions for each SCC to the requested counties. Output is produced only for the county or counties selected in the NMIM RunSpec.

The NONROAD Model includes a group of files that specify equipment populations, emission factors, deterioration rates, activities, and allocations from the State to the county level. County-specific allocation, population, seasonality, and activity files that will override the default files can be specified in the NCD.

The fuel properties required by the NONROAD Model are not the same as those in the NCD. The NONROAD Model requires "Oxygen Weight %" in its opt file. The conversion from NCD fuel properties to oxygen weight percent is performed by NMIM as follows:

oxywtpct =
etohvolume*0.3448*etohmktshare
+ mtbevolume*0.1786*mtbemktshare
+ tamevolume*0.1636*tamemktshare
+ etbevolume*0.1533*etbemktshare

These conversion factors are detailed under the OXYGENATE command in the MOBILE6 User's Guide (EPA, 2003c).

How NMIM converts from THC to other hydrocarbon (HC) species

THC is the NONROAD Model's native output. The other HC species that can be requested from NMIM are listed and defined in Table 3-3 below. The conversion from THC to the other HC species differs between exhaust and evaporative emissions. For NONROAD, NMIM classifies all emissions as either exhaust, evaporative, or refueling. NONROAD's crankcase emissions are classified as exhaust.

NMIM uses factors in the SCC table to convert NONROAD exhaust THC to the other HC outputs (VOC, NMHC, TOG, and NMOG). For evaporative emissions except for FuelType=CNG, no conversion is necessary (i.e., VOC = NMHC = TOG = NMOG = THC). For evaporative CNG emissions, TOG = THC, and NMOG = NMHC = VOC = 0.

3.1.5 Pollutants for Which Inventories Are Produced by NMIM

HCs may be expressed in one of five forms, listed in Table 3-3 below. The conversion factors are those used in the MOBILE6 and NONROAD models and depend on fuel and engine type.

Table 3-3. Hydrocarbon Forms Available from NMIM (MOBILE6 User Guide)

Hydrocarbon Form		Includes FID HC	Includes Methane	Includes Ethane	Includes Aldehydes
Total Hydrocarbons	(THC)	Yes	Yes	Yes	Partially
Nonmethane Hydrocarbons	(NMHC)	Yes	No	Yes	Partially
Volatile Organic Compounds	(VOC)	Yes	No	No	Yes
Total Organic Gases	(TOG)	Yes	Yes	Yes	Yes
Nonmethane Organic Gases	(NMOG)	Yes	No	Yes	Yes

Table 3-4 lists all pollutants for which NMIM produces inventories. The pollutant codes are those specified by NIF3.[1] Numeric codes are Chemical Abstracts Service Registry Numbers[2] (CASRN) with the hyphens removed.

In Table 3-4, a non-blank "Ratio to" column (MB for MOBILE6, NR for NONROAD) indicates that the pollutant is calculated by NMIM, after the MOBILE6 or NONROAD model is run, by ratio to the pollutant listed in the column. A blank "Ratio to" column indicates that the pollutant is calculated inside MOBILE6 or NONROAD. The ratio depends on source type, expressed as a SCC, and fuel characteristics. The complete list of these ratios may be found in the NCD SCC table and SCCToxics table. Ratio units are g/gallon, g/mile, and g/g of PM or VOC. For onroad vehicles, naphthalene is ratioed to exhaust PM and to evaporative VOC. For nonroad, it is ratioed to exhaust PM10 only. Secondary organic aerosol (SOA) is present to provide input to REMSAD (Regional Modeling System for Aerosols and Deposition[3]).

[1] Details of the NIF3 may be found as links to http://www.epa.gov/ttn/chief/nif/index.html#ver3.
[2] See EPA's Substance Registry System: http://www.epa.gov/srs/ and the CAS Registry website: http://www.cas.org/EO/regsys.html.
[3] Information on REMSAD may be found at http://remsad.saintl.com/overview.htm.

The “Six HAPs” category represents the first HAPs studied for mobile sources. They are selected individually in the NMIM RunSpec. The 27 “Add’l. HAPs” (additional HAPs) are selected as a group in the NMIM RunSpec. The 17 dioxin/furan congeners are also selected as a group. Pollutants in Table 3-4 without a category listed may be selected individually in the NMIM RunSpec. All pollutants are output separately, even if they are selected as a group.

Table 3-4. List of Pollutants for Which Inventories Are Produced by NMIM

Pollutant Code	Pollutant Name	Category	Ratio to MB	Ratio to NR
CO	Carbon Monoxide			
HC	Hydrocarbons (choice of five forms)			
NOX	Nitrogen Oxides			
SO2	Sulfur Dioxide			
PM10-PRI	Primary PM10 (Filterables and Condensibles)			
PM25-PRI	Primary PM2.5 (Filterables and Condensibles)			PM10*
NH3	Ammonia			Gal*
75070	Acetaldehyde	Six HAPS		VOC
107028	Acrolein	Six HAPS		VOC
71432	Benzene	Six HAPS		VOC
106990	1,3-Butadiene	Six HAPS		VOC
50000	Formaldehyde	Six HAPS		VOC
1634044	MTBE	Six HAPS		VOC
100414	Ethyl Benzene	Add’l. HAPS	VOC	VOC
100425	Styrene	Add’l. HAPS	VOC	VOC
108883	Toluene	Add’l. HAPS	VOC	VOC
110543	Hexane	Add’l. HAPS	VOC	VOC
120127	Anthracene	Add’l. HAPS	PM10	PM10
123386	Propionaldehyde	Add’l. HAPS	VOC	VOC
129000	Pyrene	Add’l. HAPS	PM10	PM10
1330207	Xylene	Add’l. HAPS	VOC	VOC
16065831	Chromium (Cr3+)	Add’l. HAPS	Mile	Gal
18540299	Chromium (Cr6+)	Add’l. HAPS	Mile	Gal
191242	Benzo(g,h,i)perylene	Add’l. HAPS	PM10	PM10
193395	Indeno(1,2,3,c,d)pyrene	Add’l. HAPS	PM10	PM10
205992	Benzo(b)fluoranthene	Add’l. HAPS	PM10	PM10
206440	Fluoranthene	Add’l. HAPS	PM10	PM10
207089	Benzo(k)fluoranthene	Add’l. HAPS	PM10	PM10
208968	Acenaphthylene	Add’l. HAPS	PM10	PM10
218019	Chrysene	Add’l. HAPS	PM10	PM10
50328	Benzo(a)pyrene	Add’l. HAPS	PM10	PM10
53703	Dibenzo(a,h)anthracene	Add’l. HAPS	PM10	PM10
540841	2,2,4-Trimethylpentane	Add’l. HAPS	VOC	VOC
56553	Benz(a)anthracene	Add’l. HAPS	PM10	PM10

Pollutant Code	Pollutant Name	Category	Ratio to MB	NR
7439965	Manganese	Add'l. HAPS	Mile	Gal
7440020	Nickel	Add'l. HAPS	Mile	Gal
83329	Acenaphthene	Add'l. HAPS	PM10	PM10
85018	Phenanthrene	Add'l. HAPS	PM10	PM10
86737	Fluorene	Add'l. HAPS	PM10	PM10
91203	Naphthalene	Add'l. HAPS	PMVOC	PM10
1746016	2,3,7,8-Tetrachlorodibenzo-p-Dioxin	Dioxin/furan	Mile	Gal
19408743	1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin	Dioxin/furan	Mile	Gal
3268879	Octachlorodibenzo-p-dioxin	Dioxin/furan	Mile	Gal
35822469	1,2,3,4,6,7,8-Heptachlorodibenzo-p-Dioxin	Dioxin/furan	Mile	Gal
39001020	Octachlorodibenzofuran	Dioxin/furan	Mile	Gal
39227286	1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin	Dioxin/furan	Mile	Gal
40321764	1,2,3,7,8-Pentachlorodibenzo-p-Dioxin	Dioxin/furan	Mile	Gal
51207319	2,3,7,8-Tetrachlorodibenzofuran	Dioxin/furan	Mile	Gal
55673897	1,2,3,4,7,8,9-Heptachlorodibenzofuran	Dioxin/furan	Mile	Gal
57117314	2,3,4,7,8-Pentachlorodibenzofuran	Dioxin/furan	Mile	Gal
57117416	1,2,3,7,8-Pentachlorodibenzofuran	Dioxin/furan	Mile	Gal
57117449	1,2,3,6,7,8-Hexachlorodibenzofuran	Dioxin/furan	Mile	Gal
57653857	1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin	Dioxin/furan	Mile	Gal
60851345	2,3,4,6,7,8-Hexachlorodibenzofuran	Dioxin/furan	Mile	Gal
67562394	1,2,3,4,6,7,8-Heptachlorodibenzofuran	Dioxin/furan	Mile	Gal
70648269	1,2,3,4,7,8-Hexachlorodibenzofuran	Dioxin/furan	Mile	Gal
72918219	1,2,3,7,8,9-Hexachlorodibenzofuran	Dioxin/furan	Mile	Gal
CO2	Carbon Dioxide			
SOA	Secondary Organic Aerosol		VOC*	VOC*

* Ratios for these pollutants are in the NCD SCC table. All others are in the SCCToxics table.

3.1.6 Source Categories for Which Inventories Are Produced by NMIM

NMIM's output is always in terms of SCC, which are described in the SCC table. For onroad output, NMIM also distinguishes five emission types (exhaust, evaporation, refueling, brake wear, and tire wear). For NONROAD, NMIM distinguishes three emission types (exhaust, evaporation, and refueling) and also reports the NONROAD power classes, which subdivide a given SCC by horsepower range.

The VMT in the BaseYearVMT table is by the 28 MOBILE6 vehicle classes. In NMIM output, however, these 28 vehicle classes are aggregated into the 12 vehicle classes that correspond to SCC codes. These 12 vehicle classes are shown in Table 3-5a. The NCD M6VClass table defines the correspondence between these two sets of vehicle classes, which are shown in Table 3-5b.

Table 3-5a. The 12 Vehicle Classes That Correspond to SCCs

Class	Description	Class	Description
LDGV	Light duty gasoline vehicles	LDDT	Light duty diesel trucks
LDGT1	Light duty gasoline truck 1	2BHDDV	Class 2b heavy duty diesel vehicles
LDGT2	Light duty gasoline truck 2	LHDDV	Light heavy-duty diesel vehicles
HDGV	Heavy duty gasoline vehicles, include buses	MHDDV	Medium heavy-duty diesel vehicles
MC	Motorcycles	HHDDV	Heavy heavy-duty diesel vehicles
LDDV	Light duty diesel vehicles	BUSES	Diesel buses

Table 3-5b. The 28 MOBILE6 Vehicle Classes and the 12 Vehicle Classes Corresponding to SCCs That Are Output by NMIM

M6#	28 M6	12 SCC	Description
1	LDGV	LDGV	Light-Duty Gasoline Vehicles (Passenger Cars)
2	LDGT1	LDGT1	Light-Duty Gasoline Trucks 1 (0-6,000 lbs. GVWR, 0-3750 lbs. LVW)
3	LDGT2	LDGT1	Light-Duty Gasoline Trucks 2 (0-6,000 lbs. GVWR, 3751-5750 lbs. LVW)
4	LDGT3	LDGT2	Light-Duty Gasoline Trucks 3 (6,001-8,500 lbs. GVWR, 0-5750 lbs. ALVW)
5	LDGT4	LDGT2	Light-Duty Gasoline Trucks 4 (6,001-8,500 lbs. GVWR, 5751 lbs. and greater ALVW)
6	HDGV2B	HDGV	Class 2b Heavy-Duty Gasoline Vehicles (8501-10,000 lbs. GVWR)
7	HDGV3	HDGV	Class 3 Heavy-Duty Gasoline Vehicles (10,001-14,000 lbs. GVWR)
8	HDGV4	HDGV	Class 4 Heavy-Duty Gasoline Vehicles (14,001-16,000 lbs. GVWR)
9	HDGV5	HDGV	Class 5 Heavy-Duty Gasoline Vehicles (16,001-19,500 lbs. GVWR)
10	HDGV6	HDGV	Class 6 Heavy-Duty Gasoline Vehicles (19,501-26,000 lbs. GVWR)
11	HDGV7	HDGV	Class 7 Heavy-Duty Gasoline Vehicles (26,001-33,000 lbs. GVWR)
12	HDGV8A	HDGV	Class 8a Heavy-Duty Gasoline Vehicles (33,001-60,000 lbs. GVWR)
13	HDGV8B	HDGV	Class 8b Heavy-Duty Gasoline Vehicles (>60,000 lbs. GVWR)
14	LDDV	LDDV	Light-Duty Diesel Vehicles (Passenger Cars)
15	LDDT12	LDDT	Light-Duty Diesel Trucks 1 and 2 (0-6,000 lbs. GVWR)
16	HDDV2B	2BHDDV	Class 2b Heavy-Duty Diesel Vehicles (8501-10,000 lbs. GVWR)
17	HDDV3	LHDDV	Class 3 Heavy-Duty Diesel Vehicles (10,001-14,000 lbs. GVWR)
18	HDDV4	LHDDV	Class 4 Heavy-Duty Diesel Vehicles (14,001-16,000 lbs. GVWR)
19	HDDV5	LHDDV	Class 5 Heavy-Duty Diesel Vehicles (16,001-19,500 lbs. GVWR)
20	HDDV6	MHDDV	Class 6 Heavy-Duty Diesel Vehicles (19,501-26,000 lbs. GVWR)
21	HDDV7	MHDDV	Class 7 Heavy-Duty Diesel Vehicles (26,001-33,000 lbs. GVWR)
22	HDDV8A	HHDDV	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs. GVWR)
23	HDDV8B	HHDDV	Class 8b Heavy-Duty Diesel Vehicles (>60,000 lbs. GVWR)
24	MC	MC	Motorcycles (Gasoline)
25	HDGB	HDGV	Gasoline Buses (School, Transit and Urban)
26	HDDBT	BUSES	Diesel Transit and Urban Buses
27	HDDBS	BUSES	Diesel School Buses
28	LDDT34	LDDT	Light-Duty Diesel Trucks 3 and 4 (6,001-8,500 lbs. GVWR)

SCC output also distinguishes 12 roadway types, listed in Table 3-6. The 12 roadway types are those used by the FHWA Highway Performance Monitoring System (HPMS).[4] These roadway types, in combination with the 12 vehicle types, result in 144 SCCs for onroad mobile sources.

[4] Information on the FHWA HPMS is available at http://www.fhwa.dot.gov/policy/ohpi/hpms/.

Table 3-6. 12 Roadway Types

Interstate: Rural	Interstate: Urban
Other Principal Arterial: Rural	Other Freeways and Expressways: Urban
Minor Arterial: Rural	Other Principal Arterial: Urban
Major Collector: Rural	Minor Arterial: Urban
Minor Collector: Rural	Collector: Urban
Local: Rural	Local: Urban

Emissions are estimated by the NONROAD Model for 214 SCCs. SCCs distinguish between equipment types, fuels (gasoline, diesel, LPG, and CNG) and between 2-stroke and 4-stroke gasoline engines. In addition, NONROAD produces horsepower categories, and NMIM retains these in its output.

Within NMIM and the NONROAD Model, the nonroad SCCs are grouped into 12 segments, listed in Table 3-7.

Table 3-7. NONROAD Model Equipment Segments

Recreational	Lawn/Garden	Logging	Oil Field
Construction	Agriculture	Airport Support	Pleasure Craft
Industrial	Commercial	Underground Mining	Railroad

Any single SCC always falls under only one of these segments, corresponding to its most typical application, although it may be used in other segments as well. For example, skid steer loaders are in the construction segment, although they are also used in agriculture. Fuels are gasoline, diesel, LPG, and CNG. NMIM users must choose a segment and fuel; individual SCCs may not be selected. Output, however, is by individual SCC.

3.2 THE NMIM COUNTY DATABASE

3.2.1 Database Structure

The NCD contains all the county-specific information needed to run MOBILE6 and NONROAD. It also contains the list of pollutants and the ratios of HAPs, dioxins/furans, and some metals to various NONROAD and MOBILE6 outputs that are used to estimate inventories of these nonstandard pollutants. This database is in MySQL, an open source database management system that is available from www.mysql.com. The tables in the database are listed in Table 3-8.

Table 3-8. Tables in the NMIM County Database (NCD)

Table	Contents
BaseYearVMT	VMT by year, county, M6VClass, and HPMSRoadType.
County	For each county, Federal Information Processing System (FIPS) codes for the county and State, altitude, beginning and end of ozone season, Stage 2 information, Natural Gas Vehicle (NGV) fraction file name
CountyMap	The representing county for each county, one for NONROAD and one for MOBILE6.
CountyMonth	Defines the set of possible county-month combinations.
CountyMonthHour	Monthly average hourly temperature and humidity table used if "Use yearly weather data" is not selected or there is no data for the requested year in the CountyYearMonthHour table.
County NRFile	References to external NONROAD files pertaining to a county.
CountyVMTMonth Allocation	Mileage allocation factors for the 12 months of the year, by county.
CountyYear	Stage2 percent input to the NR model, plus external file references for MOBILE6 and NR.
CountyYearMonth	Gasoline, diesel, and natural gas fuel IDs for each county for each year and month.
CountyYearMonth Hour	Historical hourly temperature and relative humidity.
DataSource	Defines datasource identifiers used in other tables.
Diesel	Diesel sulfur content associated with each diesel ID.
EmissionType	Associates emission types (exhaust, evap, brake, tire) with EmissionTypeID used in other tables
FileType	Defines the set of valid external files and their 3-character extensions.
Gasoline	Detailed fuel properties associated with each gasoline ID.
Hour	Defines the hour identifiers.
HPMSRoadType	Defines the 12 HPMS road type identifiers.
M6VClass	Defines the 28 vehicle classes used in MOBILE6. These are the valid combinations of M6Vtype and fuel.
M6VType	Defines the fuel-independent vehicle types used in MOBILE6.
NaturalGas	Natural gas sulfur content associated with each natural gas ID.
PollutantCode	Associates NIF pollutant codes and pollutant names with PollutantCodeID used in other tables.
SCC	Associates with each SCCID an SCC code and description, and ratios for NH_3, PM25, and for converting between HC forms.
SCCToxics	SCC and fuel property-dependent ratios for calculating HAPs, dioxin/furans, and metals.
State	Associates State names and abbreviations with State FIPS codes used in other tables.
VMTGrowth	The annual VMT growth rate for a M6VClass by county and year.
VMTMonth Allocation	Factors for allocating annual VMT to the 12 months, by M6VType and HPMSRoadType, used if there are no county-specific values in CountyVMTMonthAllocation.

3.2.2 Onroad VMT

The NCD is populated with VMT data developed from information provided by the FHWA, as well as 2002 State-supplied VMT data grown to 2005. For 2005, a full VMT database developed from FHWA information at the county, roadway type, and vehicle type level of detail was first prepared. For States and local areas that submitted VMT data that were incorporated in the 2002 NEI, the 2002 NEI VMT data were grown to 2005 using growth factors developed from the FHWA data, and these grown VMT data replaced the baseline FHWA-based 2005 VMT data. Finally, the default 2005 VMT data were then replaced by State data where these data were supplied to EPA for the 2005 NEI effort. VMT data in the NCD is contained in the BaseYearVMT table. To use this table, the VMT data for a given county must contain records for each of the 12 HPMS functional roadway types and the 28 MOBILE6 vehicle classes, for a total of 336 records in this table per county. The VMT data in the NMIM BaseYearVMT table is annual data in units of millions of miles.

3.2.2.1 Annual

3.2.2.1.1 Data Sources Used to Develop VMT

The 2005 VMT database was developed using data supplied directly by FHWA and as well as publicly available data from FHWA's *Highway Statistics* data series (FHWA, 2006). The FHWA data sets that were provided include the HPMS universe data, sample data, state data summaries for rural minor collector, rural local, and small urban local, and local daily VMT for urbanized areas (Rozycki, 2006). The *Highway Statistics* data used in the VMT development include:

- Table VM-2, "Functional System Travel, Annual Vehicle-Miles,"
- Table VM-1, "Annual Vehicle Distance Traveled in Miles and Related Data by Highway Category and Vehicle Type," and
- Table HM-71, "Urbanized Areas, Miles and Daily Vehicle-Miles of Travel."

Table VM-2 contains State-level summaries of miles of annual travel in each State by functional system and by rural and urban areas. Rural VMT is provided on a state level for the six HPMS rural functional roadway types: interstate, other principal arterial, minor arterial, major collector, minor collector, and local. Urban VMT is provided on a state level for the six HPMS urban roadway types: interstate, other freeways and expressways, other principal arterial, minor arterial, collector, and local.

Table VM-1 provides annual VMT separated by rural and urban areas broken down into the following vehicle categories: passenger cars, motorcycles, buses, other 2-axle 4-tire vehicles, single-unit 2-axle 6-tire or more trucks, and combination trucks.

From the HPMS data tables, Pechan extracted daily VMT by urban area (areas with a population of 50,000 or more) and State in each of the six HPMS urban functional roadway categories. The resulting data is similar to that in Table HM-71 from *Highway Statistics* with the exception that Table HM-71 does not break down multi-state urban areas into the portion in each state. Pechan also calculated the year-specific roadway mileage by county and each of the 12 HPMS functional roadway classes from the HPMS data sets provided by FHWA.

In addition to the FHWA data, the 2005 Census population estimates were used in developing the VMT database (USCB, 2006). The population file downloaded from this site was labeled "County population and estimated components of population change, all counties: April 1, 2000 to July 1, 2005." The breakdown of population within a county by urban, rural, and small urban designation is only available from the decennial census. Thus, the population ratios of urban, small urban, and rural population to total county population are based on data from the 2000 Census, and are the same as those used in the 2002 NEI VMT development. These ratios are multiplied by the year-specific county population data to estimate the urban, small urban, and rural populations in each county for 2005.

3.2.2.1.2 How Does EPA Estimate VMT?

The estimation of VMT is done by first developing a VMT database from the FHWA data and then replacing the FHWA-based VMT with State-based VMT grown to 2005 for States and local areas that supplied VMT data used in the 2002 NEI. The development of the FHWA-based VMT starts with State-level VMT totals for each year from *Highway Statistics* Table VM-2. The State-level VMT are then allocated by county, roadway type, and vehicle type. There are four basic steps in this process: (1) allocate state-level rural VMT by roadway type to county/roadway type level; (2) allocate large urban area VMT by roadway type to the county/roadway type level; (3) allocate remaining state-level small urban VMT by roadway type to the county/roadway type level; and (4) allocate county/roadway type level VMT to each of the 28 MOBILE6 vehicle classes for each county and roadway type combination. Each of these steps is described in more detail in the following sections, followed by a discussion of the procedure for growing the State-based VMT.

<u>2002 Rural VMT Development</u>

Rural Interstates

Rural interstate VMT is allocated from the State level to the county level based on rural interstate roadway mileage. To estimate county-level VMT on rural interstates, EPA calculated each county's fraction of the State's total rural interstate roadway mileage and then multiplied that fraction by the State's 2005 rural interstate VMT total from Table VM-2. Equation 1 shows this calculation.

$$VMT_{RI,C} = VMT_{RI,S} * (MIL_{RI,C} / MIL_{RI,S}) \qquad \text{(Eq. 1)}$$

where:	$VMT_{RI,C}$	=	Rural interstate VMT in county C (calculated)
	$VMT_{RI,S}$	=	Rural interstate VMT, State total (*Highway Statistics* Table VM-2)
	$MIL_{RI,C}$	=	Rural interstate mileage in county C (FHWA)
	MILRI,S	=	Rural interstate mileage, State total (FWHA)

Rural Local Roads

For the rural local roadway type, VMT was allocated from the State to the county level using rural population to determine the allocation fractions. The 2005 rural population was first estimated at the county level by multiplying the Census Bureau's year-specific county-level population estimates by the ratio of each county's rural population from the 2000 Census to its total rural plus urban 2000 population. The rural local VMT at the county level was then calculated by multiplying the State's rural local VMT total by the ratio of a county's rural population to the State's rural population. The equation used for this calculation is the same as Equation 1, but with rural interstate mileage replaced by rural population.

Other Rural Roadway Types

EPA allocated VMT for the remaining four rural roadway types (other principal arterials, minor arterials, major collectors, and minor collectors) from the State level to the county level using rural county population as the primary source of the VMT allocation. Additionally, VMT for a specific roadway type was distributed only to counties with nonzero roadway mileage of the specified roadway type, based on the roadway mileage file data from FHWA. Thus, rural population within a State was totaled individually for each of these four rural roadway types, including only population from counties with nonzero roadway mileage of the specified roadway type. Equation 2 shows the equation used to calculate county-level VMT on rural roadway types other than rural interstates.

$$VMT_{RX,C} = VMT_{RX,S} * (POP_{RX,C} / POP_{RX,S}) \qquad \text{(Eq. 2)}$$

where:

$VMT_{RX,C}$	=	VMT on rural roadtype X in county C (calculated)
$VMT_{RX,S}$	=	VMT on rural roadtype X, State total (*Highway Statistics* Table VM-2)
$POP_{R,C}$	=	Rural population in county C with nonzero mileage from rural roadway type X (0 if zero mileage from rural roadway type X in county C) (Census)
$POP_{R,S}$	=	Rural population, State total of all counties with nonzero mileage from rural roadway type X (Census)

<u>2002 Urban Area VMT Development</u>

The procedure for developing urban area VMT at the county and road type level involves allocating the FHWA State/urban area VMT data to the county level using the Census data on urban area population by county as well as the FHWA roadway mileage data by county and road type. The FHWA urban area VMT data are in units of average daily miles. These data are first converted to millions of annual miles to be consistent with the Table VM-2 State-level data by multiplying the urban area VMT data by 365 and dividing by 1,000,000.

The urban area population contributed by each of the counties contained at least in part by the urban area is prepared only for the decennial censuses. Therefore, fractions were calculated from the year 2000 population data of the ratio of the county population in each State/urban area combination to the total State/urban area population for each State/urban area. As shown in Equation 3, each county's share of a State/urban area's VMT were calculated by distributing urban area VMT from the HPMS State/urban area VMT data based on the fraction of the urban area's population contained in a given county. As with the rural VMT allocations, VMT for a specific roadway type is distributed only to counties with nonzero roadway mileage of the specified roadway type, based on the HPMS roadway mileage data. Thus, the county-level State/urban population fractions are divided by the total State/urban area population fraction from counties with nonzero roadway mileage of the specified roadway type. For the urban local roadway category, VMT is distributed strictly by urban population, assuming that all counties with urban populations have mileage in the urban local roadway category.

$$VMT_{X,C} = VMT_{X,A} * (POP_{X,C} / POP_{X,A}) \quad \text{(Eq. 3)}$$

where: $VMT_{X,C}$ = State/urban area A's VMT on roadway type X in county C (calculated)
$VMT_{X,S}$ = Total of State/urban area A's VMT on roadway type X (FHWA)
$POP_{X,C}$ = State/urban area A's population fraction in county C with nonzero mileage from urban roadway type X (Census)
$POP_{X,A}$ = State/urban area A's total population fraction from all counties with nonzero mileage from urban roadway type X (Census)

2002 Small Urban VMT Development

The urban VMT included in Table VM-2 of *Highway Statistics 2002* accounts for VMT from both urban (population greater than 50,000) and small urban areas. Thus, small urban VMT is calculated by subtracting the urban VMT, calculated as discussed above, from the urban VMT totals in Table VM-2. First, the resultant annual VMT for urban areas was totaled by State and roadway type and was then subtracted from the total urban VMT by State and roadway type reported in Table VM-2. This calculation results in small urban VMT by State and roadway type.

To allocate the small urban VMT to the county level, EPA first estimated the county-level population in small urban areas. The Census 2000 urban area population from Census-defined urban areas was totaled by county to determine the population in each county falling in the Census-defined urban areas. This population was then subtracted from the Census total urban population for each county in 2000. The small urban population fraction was then calculated for each county as the ratio of the county small urban county population to the total county population. These 2000 small urban population fractions by county were then multiplied by the 2005 county-level population to estimate 2005 small urban population. Finally, each county's small urban population was calculated as a fraction of the total State's small urban population to use in allocating the small urban VMT from the State to the county level.

As with the rural and urban VMT allocations, the small urban VMT for a specific roadway type was distributed only to counties with nonzero roadway mileage of the specified roadway type, based on the FHWA roadway mileage data. Thus, the county-level State/small urban population fractions are divided by the total State/small urban population fraction from counties with nonzero roadway mileage of the specified roadway type. For the small urban local roadway category, VMT is distributed strictly by small urban population, assuming that all counties with small urban populations have mileage in the urban local roadway category. Equation 4 shows the equation used to calculate county-level VMT on small urban roadway types.

$$VMT_{SX,C} = VMT_{SX,S} * (POP_{SX,C} / POP_{SX,S}) \quad \text{(Eq. 4)}$$

where: $VMT_{SX,C}$ = VMT on small urban roadtype X in county C (calculated)

$VMT_{SX,S}$ = VMT on small urban roadtype X, State total (obtained by subtracting large urban VMT from total urban VMT from *Highway Statistics* Table VM-2)

$POP_{SX,C}$ = Small urban population fraction in county C with nonzero mileage from urban roadway type X (Census data) (0 if zero mileage from urban roadway type X in county C)

$POP_{SX,S}$ = State's small urban population fraction total from all counties with nonzero mileage from urban roadway type X (Census data)

3.2.2.1.3 2002 VMT Allocation by Vehicle Type

In order to be compatible with the VMT data contained in the NMIM National County Database, the 2005 VMT must be allocated to the 28 MOBILE6 vehicle types for each county and roadway type. This allocation was done for each year using the distribution of the VMT among the six HPMS vehicle types found in Table VM-1 of FHWA's *Highway Statistics* for each year and a mapping of these HPMS vehicle categories to the 28 MOBILE6 vehicle types. First, the VMT totals for each of the six HPMS vehicle categories (passenger cars, motorcycles, other 2-axle 4-tire vehicles, single unit 2-axle 6-tire or more trucks, combination trucks, and buses) were calculated as a fraction of the total VMT. This calculation was performed separately for five groups of roadway classes. The resulting 2005 HPMS VMT fractions for each roadway class group are shown in Table 3-9. Next, each of the 28 MOBILE6 vehicle types was assigned to one of the 6 HPMS vehicle categories, as shown in Table 3-10. This table also provides mapping of MOBILE6 vehicle classes to the eight MOBILE5 vehicle classes and the 12 SCC-level vehicle categories. Using the default year-specific MOBILE6 VMT fractions presented in Table 3-11, the MOBILE6 VMT fractions for all of the MOBILE6 vehicle types within a given HPMS vehicle category were renormalized so that the total of the renormalized VMT fractions from all of the MOBILE6 vehicle types within an HPMS vehicle category would be 1. Then the HPMS VMT fractions for each roadway group were separately multiplied by the renormalized MOBILE6 VMT fractions for all MOBILE6 vehicle types included within a given HPMS vehicle category.

For example, Table 3-10 shows that the HPMS Passenger Car vehicle category includes the MOBILE6 LDGV and LDDV vehicle types. Therefore, the default 2005 MOBILE6 VMT fraction for LDGVs (0.415795 in 2005) was renormalized by dividing it by the sum of the LDGV and LDDV default 2005 MOBILE6 VMT fractions (0.416352 in 2005). This number (0.415795/0.416352 or 0.998662) was then multiplied by the HPMS VMT fraction for Passenger Cars (0.473242 for rural interstates). This resulted in a LDGV VMT fraction of 0.472608 and LDDV VMT fraction of 0.000633 on rural interstates.

Table 3-9. HPMS 2005 VMT Fractions by Road Types and Vehicle Categories

Road Type	Passenger Cars	Motorcycles	Buses	Other 2-Axle 4-Tire Vehicles	Single-Unit 2-Axle 6-Tire or More Trucks	Combination Trucks
Rural Interstate	0.473242	0.005537	0.003750	0.317665	0.029980	0.169827
Rural Other Principal Arterial Rural Minor Arterial	0.521711	0.003536	0.002409	0.371768	0.035350	0.065226
Rural Major Collector Rural Minor Collector Rural Local	0.548301	0.004271	0.004360	0.367183	0.038705	0.037180
Urban Interstate	0.553440	0.004896	0.002055	0.354199	0.022367	0.063043
Urban Other Freeways and Expressways Urban Other Principal Arterial Urban Minor Arterial Urban Collector Urban Local	0.601088	0.002702	0.001412	0.352926	0.021652	0.020221

Table 3-10. Mapping of HPMS Vehicle Categories to MOBILE6, MOBILE5, and SCC-Level Vehicle Classes

HPMS Vehicle Category	MOBILE6 Vehicle Classes	SCC-Level Vehicle Classes	MOBILE5 Vehicle Classes
Passenger Cars	LDGV	LDGV (2201001)	LDGV
	LDDV	LDDV (2230001)	LDDV
Motorcycles	MC	MC (2201080)	MC
Other 2-Axle 4-Tire Vehicles	LDGT1 LDGT2	LDGT1 (2201020)	LDGT1
	LDGT3 LDGT4	LDGT2 (2201040)	LDGT2
	LDDT12 LDDT34	LDDT (2230060)	LDDT
	HDGV2B	HDGV (2201070)	HDGV
	HDDV2B	2BHDDV (2230071)	HDDV
Single-Unit 2-Axle 6-Tire or More Trucks	HDGV3 HDGV4 HDGV5 HDGV6 HDGV7	HDGV (2201070)	HDGV
	HDDV3 HDDV4 HDDV5	LHDDV (2230072)	HDDV
	HDDV6 HDDV7	MHDDV (2230073)	HDDV
Combination Trucks	HDGV8A HDGV8B	HDGV (2201070)	HDGV
	HDDV8A HDDV8B	HHDDV (2230074)	HDDV
Buses	HDGB	HDGV (2201070)	HDGV
	HDDBT HDDBS	BUS (2230075)	HDDV

Table 3-11. VMT Fractions by MOBILE6 Vehicle Categories

Vehicle No.	Vehicle Category	VMT Fractions		
		2003	2004	2005
1	LDGV	0.442395	0.428586	0.415795
2	LDGT1	0.073794	0.076069	0.078241
3	LDGT2	0.245658	0.253227	0.260463
4	LDGT3	0.075257	0.077564	0.079773
5	LDGT4	0.034606	0.035668	0.036686
6	HDGV2B	0.029423	0.029643	0.029718
7	HDGV3	0.001045	0.001050	0.001052
8	HDGV4	0.000479	0.000454	0.000430
9	HDGV5	0.001143	0.001130	0.001115
10	HDGV6	0.002447	0.002407	0.002365
11	HDGV7	0.001086	0.001042	0.001008
12	HDGV8A	0.000004	0.000003	0.000003
13	HDGV8B	0.000000	0.000000	0.000000
14	LDDV	0.000660	0.000587	0.000557
15	LDDT12	0.000189	0.000186	0.000192
16	HDDV2B	0.009302	0.009273	0.009221
17	HDDV3	0.002798	0.002802	0.002797
18	HDDV4	0.002552	0.002619	0.002671
19	HDDV5	0.001156	0.001195	0.001226
20	HDDV6	0.006131	0.006245	0.006316
21	HDDV7	0.009045	0.009172	0.009229
22	HDDV8A	0.011058	0.011116	0.011128
23	HDDV8B	0.039409	0.039632	0.039694
24	MC	0.005918	0.005815	0.005745
25	HDGB	0.000440	0.000400	0.000336
26	HDDBT	0.000943	0.000939	0.000941
27	HDDBS	0.001511	0.001566	0.001631
28	LDDT34	0.001551	0.001609	0.001666

Table 3-12 lists the resulting VMT fractions for 2005 for each of the MOBILE6 vehicle types and each of the five roadway groups from Table VM-1 of *Highway Statistics*. Finally, each of the VMT records in the 2005 VMT data base, at the state/county/roadway type level of detail was then multiplied by the fraction of VMT in each of the corresponding MOBILE6 vehicle type categories to obtain total annual VMT at the state/county/roadway type/MOBILE6 vehicle type level.

Table 3-12. Allocation of VMT from HPMS Vehicle Categories to MOBILE6 Vehicle Classes for 2005

HPMS Vehicle Category	MOBILE6 Vehicle Classes	Rural Interstates	Rural Arterials	Rural Other	Urban Interstates	Urban Other
Passenger Cars	LDGV	0.472608	0.521013	0.546521	0.553338	0.600284
	LDDV	0.000633	0.000698	0.000732	0.000741	0.000804
Motorcycles	MC	0.005537	0.003536	0.004263	0.004901	0.002702
Other 2-Axle 4-Tire Vehicles	LDGT1	0.050114	0.058649	0.057815	0.055942	0.055676
	LDGT2	0.166828	0.195241	0.192465	0.186229	0.185346
	LDGT3	0.051095	0.059797	0.058947	0.057037	0.056767
	LDGT4	0.023498	0.027500	0.027109	0.026230	0.026106
	LDDT12	0.000123	0.000144	0.000142	0.000137	0.000137
	LDDT34	0.001067	0.001249	0.001231	0.001191	0.001186
	HDGV2B	0.019035	0.022276	0.021960	0.021248	0.021147
	HDDV2B	0.005906	0.006912	0.006814	0.006593	0.006562
Single-Unit 2-Axle 6-Tire or More Trucks	HDGV3	0.001118	0.001318	0.001441	0.000835	0.000807
	HDGV4	0.000457	0.000539	0.000589	0.000341	0.000330
	HDGV5	0.001185	0.001397	0.001527	0.000885	0.000856
	HDGV6	0.002513	0.002964	0.003239	0.001877	0.001815
	HDGV7	0.001071	0.001263	0.001380	0.000800	0.000774
	HDDV3	0.002973	0.003505	0.003830	0.002220	0.002147
	HDDV4	0.002839	0.003347	0.003658	0.002120	0.002050
	HDDV5	0.001303	0.001536	0.001679	0.000973	0.000941
	HDDV6	0.006712	0.007915	0.008649	0.005014	0.004848
	HDDV7	0.009808	0.011565	0.012639	0.007326	0.007084
Combination Trucks	HDGV8A	0.000010	0.000004	0.000002	0.000004	0.000001
	HDGV8B	0.000000	0.000000	0.000000	0.000000	0.000000
	HDDV8A	0.037183	0.014281	0.008125	0.013819	0.004427
	HDDV8B	0.132634	0.050941	0.028982	0.049293	0.015793
Buses	HDGB	0.000433	0.000278	0.000503	0.000238	0.000163
	HDDBT	0.001214	0.000780	0.001408	0.000666	0.000457
	HDDBS	0.002103	0.001351	0.004352	0.000000	0.000792
Total		1.000000	1.000000	1.000000	1.000000	1.000000

3.2.2.1.4 How Were 2002 State VMT Estimates Incorporated into the 2005 NEI?

For the final version of the 2002 NEI, a number of State and local agencies submitted 2002 VMT data that were accepted by EPA for incorporation into the NEI. Table 3-13 lists the States that submitted VMT. Unless a specific county is listed, VMT data were submitted for all counties. Otherwise, VMT data were submitted only for the county listed. For a complete description of procedures used to incorporate State-supplied VMT into the 2002 NEI, see EPA, 2007b. For these States and counties, the 2002 VMT data from the 2002 Final NEI, as contained in the 2002 NMIM National County Database (NCD20060201) Base Year VMT table, were projected to 2005.

Table 3-13. List of States or Counties with State or Locally-Provided VMT in the 2002 NEI

State	County
Alabama	
Arizona	Maricopa County
Arkansas	
California	
Colorado	
Connecticut	
Delaware	
District of Columbia	
Georgia	
Idaho	
Illinois	
Iowa	
Kentucky	Jefferson County
Maine	
Maryland	
Massachusetts	
Michigan	
Minnesota	
Mississippi	
Missouri	
Nebraska	Lancaster County
Nevada	
New Jersey	
New Mexico	
New York	
North Carolina	
Oregon	
Pennsylvania	
Rhode Island	
South Carolina	
Tennessee	
Texas	
Utah	
Vermont	
Virginia	
Washington	
West Virginia	

Pechan developed VMT growth factors based on the FHWA-based VMT data files developed as described above for 2005. A comparable file prepared earlier for 2002 was also used. The growth factors were calculated at the State, county, vehicle type, and road type level of detail by dividing the year 2005 VMT value by the corresponding 2002 VMT value, all from the FHWA-based VMT databases. Next, each VMT value from the 2002 NMIM National County Database BaseYearVMT that was based on State or locally-provided data was multiplied by the corresponding growth factor at the state, county, road type, and MOBILE6 vehicle type level.

In cases where the growth factor was calculated to be 0, the 2002 NMIM NCD VMT was multiplied by a factor of 1. In cases where the growth factors are not equal to zero and the 2002 NMIM NCD VMT are equal to zero, the projected VMT values are reported as 0.

Table 3-14 provides sample data for projecting 2002 State-provided VMT to 2005. The data presented in these tables are based on Kent County, Delaware, VMT data for vehicle categories LDGV, HDGV2B, and LDDT34.

3.2.2.1.5 How were 2005 State VMT Estimates Incorporated in the NEI

For the 2005 NEI, 2005 VMT data were submitted in several different formats. Several States submitted VMT data in the NMIM BaseYearVMT table format. Others supplied VMT at the 8 or 12 vehicle type level. Therefore, EPA developed procedures to expand all of the VMT data to the 28 vehicle type and 12 roadway type level of detail. The procedures followed to expand the VMT for all of these States to the 28 vehicle type level and 12 roadway type level are discussed below.

<u>Expanding State/Local VMT to the 28 Vehicle Classes</u>

In nearly all cases the vehicle class information available from measurements of VMT, such as those obtained from the HPMS or State departments of transportation, are not as detailed as used by NMIM. The vehicle classifications used in NMIM are the same as used in the MOBILE6 output (see Table 3-5b).

EPA guidance ("Technical Guidance on the Use of MOBILE6 for Emission Inventory Preparation," January 2002, Section 4.1 (EPA, 2002a)) allows the use of the VMT distribution calculated by MOBILE6 to be used to disaggregate local VMT information into more disaggregate vehicle classifications. However, the 28 MOBILE6 vehicle classes must be mapped unambiguously to the more aggregate eight MOBILE5 or 12 SCC level vehicle types. Table 3-15 shows the mapping of the MOBILE6 classes to the eight or 12 vehicle classifications.

Table 3-14. Calculation and Application of 2002 to 2005 Growth Factors for an Example County

State	County	Class No.	Road Type	MOBILE6 Vehicle Type	FHWA VMT		NMIM County Database 2002 VMT	Growth Factors	Projected State – provided VMT
					2002	2005			
DE	Kent County	11	Rural Interstate	LDDT34	0.0000	0.0000	0.0608	0.0000	0.0608
DE	Kent County	13	Rural Other Principal Arterial	LDDT34	0.5696	0.4891	1.0873	0.8587	0.9337
DE	Kent County	15	Rural Minor Arterial	LDDT34	0.1593	0.1185	0.2511	0.7439	0.1868
DE	Kent County	17	Rural Major Collector	LDDT34	0.2460	0.2242	0.3925	0.9114	0.3577
DE	Kent County	19	Rural Minor Collector	LDDT34	0.0399	0.0412	0.0199	1.0326	0.0205
DE	Kent County	21	Rural Local	LDDT34	0.2206	0.1549	0.0711	0.7022	0.0499
DE	Kent County	23	Urban Interstate	LDDT34	0.0000	0.0000	0.0000	0.0000	0.0000
DE	Kent County	25	Urban Other Freeways and Expressway	LDDT34	0.0987	0.1209	0.1286	1.2249	0.1575
DE	Kent County	27	Urban Other Principal Arterial	LDDT34	0.1071	0.3001	0.1464	2.8021	0.4102
DE	Kent County	29	Urban Minor Arterial	LDDT34	0.2164	0.3876	0.2439	1.7911	0.4368
DE	Kent County	31	Urban Collector	LDDT34	0.1237	0.1711	0.0765	1.3832	0.1058
DE	Kent County	33	Urban Local	LDDT34	0.0995	0.2451	0.0054	2.4633	0.0133

Table 3-15. Mapping of MOBILE6 to MOBILE5 Vehicle Classes

MOBILE5 8 Vehicle Classes	SCC-Level 12 Vehicle Classes	MOBILE6 Vehicle Class	MOBILE6 Vehicle Class Code
LDGV	LDGV (2201001)	LDGV	1
LDGT1	LDGT1 (2201020)	LDGT1	2
		LDGT2	3
LDGT2	LDGT2 (2201040)	LDGT3	4
		LDGT4	5
HDGV	HDGV (2201070)	HDGV2B	6
		HDGV3	7
		HDGV4	8
		HDGV5	9
		HDGV6	10
		HDGV7	11
		HDGV8A	12
		HDGV8B	13
		HDGB	25
MC	MC (2201080)	MC	24
LDDV	LDDV (2230001)	LDDV	14
LDDT	LDDT (2230060)	LDDT12	15
		LDDT34	28
HDDV	2BHDDV (2230071)	HDDV2B	16
	LHDDV (2230072)	HDDV3	17
		HDDV4	18
		HDDV5	19
	MHDDV (2230073)	HDDV6	20
		HDDV7	21
	HHDDV (2230074)	HDDV8A	22
		HDDV8B	23
	BUS (2230075)	HDDBT	26
		HDDBS	27

Next, the fractions of each MOBILE5 or SCC-level vehicle type represented by each MOBILE6 class is calculated. For clarity, the calculated fractions are referred to here as “factors” and the original VMT fractions as “fractions.” This factor is the MOBILE6 VMT fraction divided by the sum of all MOBILE6 VMT fractions which are mapped into that MOBILE5 or SCC-level vehicle type to which the each MOBILE6 VMT fraction belongs. For example, the representing factor for LDGV, LDDV and MC are one, since there is only one MOBILE6 vehicle class (themselves) in the corresponding MOBILE5 class in which they belong. The MOBILE6 LDGT1 fraction would be divided by the sum of the MOBILE6 LDGT1 and LDGT2 fractions, which both belong to the MOBILE5 LDGT1 category to give the LDGT1 factor. Each MOBILE6 class fraction mapped to the MOBILE5 HDDV category would be divided by the sum of the MOBILE6 fractions from all ten of the classes mapped to that MOBILE5 category. When completed, there will be 28 factors. The value of the sum of the factors within each MOBILE5 category will be one, when starting with data at the 8 MOBILE5 vehicle class level.

The factors are applied to the eight VMT values corresponding to each of the eight MOBILE5 vehicle classifications or to the 12 VMT values corresponding the each of the 12 SCC-level vehicle classifications. This divides the VMT in each of the MOBILE5 or SCC-level classes to the MOBILE6 classes that make it up. When completed, the total VMT sum of all 28 vehicle classes will be the same as the total VMT sum from the original eight VMT values.

Expanding State/Local VMT by Roadway Type

As mentioned above, several State or local agencies supplied VMT data that was not allocated by roadway type. In these cases, EPA relied on the VMT data from the 2005 NEI Version 1 to allocate the VMT by roadway type to develop ratios of VMT by roadway type for each county and vehicle type. These ratios were then used to allocate the VMT data developed as discussed above to the 12 roadway types.

3.2.2.2 Monthly Allocation

The table CountyVMTMonthAllocation within the NCD provides the ability to supply NMIM with monthly temporal allocation factors. If these data are supplied, the allocation factors must be specified by the 28 vehicle types, 12 roadway types, and for each month of the year. State or local data were supplied by Delaware, Maryland, Minnesota, Utah, and Washington for these monthly temporal allocation factors. In some cases, the data supplied by the State agencies was replicated by EPA to include the appropriate coverage in NMIM. For example, if a State supplied monthly temporal allocation factors with corresponding county, road type, and month codes, but no vehicle type codes, the monthly factors were replicated so that the same data would be provided for each vehicle type corresponding to the county, road type, and month provided by the State.

The table CountyVMTMonthAllocation within the NCD contains the NMIM default values for the monthly temporal allocation factors. Annual VMT data are temporally allocated to months within the NMIM code using defaults if no data are included in the NMIM CountyVMTMonthAllocation table. EPA uses seasonal 1985 National Acid Precipitation Assessment Program (NAPAP) temporal allocation factors (EPA, 1990) to apportion the VMT to the four seasons. Monthly VMT data are then obtained by using a ratio between the number of days in a month and the number of days in the corresponding season. These temporal factors are shown in Table 3-16.

Table 3-16. NMIM Default VMT Seasonal and Monthly Temporal Allocation Factors

Vehicle Type	Roadway Type	Seasonal VMT Factors Winter	Spring	Summer	Fall
LDV, LDT, MC	Rural	0.2160	0.2390	0.2890	0.2560
LDV, LDT, MC	Urban	0.2340	0.2550	0.2650	0.2450
HDV	All	0.2500	0.2500	0.2500	0.2500

		Monthly VMT Factors											
Vehicle Type	Roadway Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
LDV, LDT, MC	Rural	7.44	6.72	8.05	7.79	8.05	9.42	9.74	9.75	8.44	8.72	8.44	7.44
LDV, LDT, MC	Urban	8.06	7.28	8.6	8.33	8.6	8.65	8.94	8.94	8.09	8.36	8.09	8.06
HDV	All	8.62	7.78	8.42	8.15	8.42	8.15	8.42	8.42	8.24	8.52	8.24	8.62

3.2.3 Fuel Properties

NMIM contains average gasoline, diesel and natural gas fuel properties for each month of calendar year 2005. Each county may have different fuel properties from other counties in the State, as reflected in the CountyYearMonth table of the NCD. For Version 2 of the 2005 NEI, several States provided information to update fuel properties for their counties.

3.2.3.1 Gasoline

The same gasoline fuel properties are used for both onroad and nonroad inventories. The fuel properties stored in the Gasoline table include:

- Average RVP
- Average sulfur content
- Maximum sulfur content
- RVP waiver flag indicating whether a waiver has been granted to allow splash blending of alcohol-based oxygenates that allows alcohol-based oxygenated fuels to exceed the RVP requirements by up to 1 pound per square inch (psi)
- Ethanol (ETOH) percent (by volume) of ethanol blended gasolines
- Ethanol blend market share
- MTBE (percent (by volume) of ether blended gasolines
- MTBE blend market share
- ETBE (Ethyl Tertiary Butyl Ether) percent (by volume) of ether blended gasolines
- ETBE blend market share
- TAME (Tertiary Amyl Methyl Ether) percent (by volume) of ether blended gasolines
- TAME blend market share
- Aromatic content
- Olefin content
- Benzene content
- E200 (vapor percentage of gasoline at 200 degrees Fahrenheit)
- E300 (vapor percentage of gasoline at 300 degrees Fahrenheit)
- Reformulated gasoline (RFG) flag

For the 2005 NEI Version 1, the gasoline properties were derived from several surveys including:

- EPA's "2005 Reformulated Gasoline Properties Survey Data" (EPA, 2005a)
- 2005 Alliance of Automobile Manufacturers (AAM) survey (AAM, 2005)
- EPA's "Reformulated Gasoline and Anti-Dumping Regulation Batch Reports" (EPA, 2005b)
- U.S. DOE's Energy Information Administration's Petroleum Supply Annual 2005 (DOE, 2005)

The fuel properties of gasoline are currently being measured regularly in national surveys in both summer and winter. There are also studies that track the total amount of ethanol produced for use in gasoline each year. The properties of Reformulated Gasoline sold in areas which are federally required to have them are measured each year. In addition, the fuel properties of all gasoline produced and imported by refineries are reported annually to EPA. This information can be used to estimate the expected average gasoline properties in a given historical calendar year. Using this information combined with information about the distribution of gasoline to and from Petroleum Administration for Defense Districts (PADDs) in combination with the city specific surveys, the average gasoline properties in each county can be estimated.

Details of how the fuel survey data were applied to individual States and counties are described in the report, "Process for Utilizing Survey Data to Determine County Specific Gasoline Properties" (EPA, 2008).

For the 2005 NEI, changes were made to gasoline IDs in some of the counties in the following States:

- Maine (FIPSStateID=23)
- Maryland (24)
- Michigan (26)
- Wisconsin (55)

Below is a brief description of the changes in the fuel specifications provided by States for the 2005 NEI.

Maine (23)

Gasoline formulations were updated for all six gasoline descriptions used in the state of Maine. A couple of month-specific RVP changes were made, and parameters used for air toxics modeling were changed. These changes were made based on information from a report entitled, "2005 Maine Fuels Report and Status of MTBE Ban Report."

Maryland (24)

Gasoline formulations for both onroad and nonroad engines were updated based on data provided by Maryland for counties in RFG areas. This change affected gasoline properties for 14 counties in the State. In addition, diesel sulfur levels for onroad engines were updated for all counties using existing diesel fuel profiles and eight additional profiles added by Maryland (see discussion of diesel sulfur defaults in Section 3.2.3.2).

Michigan (26)

Gasoline formulations for nonroad engines were updated based on data provided by Michigan for all counties.

Wisconsin (55)

Gasoline formulations for nonroad engines were revised for all counties in the State. For the six counties with RFG programs (Kenosha, Milwaukee, Ozaukee, Racine, Washington and Waukesha Counties), May through October RVP values were updated. In addition, year-round values for gasoline sulfur, ETOH, Aromatic Content, Olefin Content, Benzene Content, E200 and E300 were revised. For all other counties in Wisconsin, these same values were updated, in addition to the presumed market share for ETOH and MTBE.

3.2.3.2 Diesel and Natural Gas

For diesel fuel and natural gas, the only fuel property stored is sulfur content, in the Diesel and Natural Gas tables of the NCD, respectively.

3.2.3.2.1 Diesel Sulfur Contents for Onroad Vehicles

For the final 2002 NEI, OTAQ developed diesel sulfur content values for each State based on 2000 January and July diesel fuel sulfur content data obtained for a number of survey cities from the AAMA fuel surveys done each calendar year in the January and July (AAM, 2002). The same values were used for 2005.

The January sulfur data were applied in the winter months (December, January, and February) and the July sulfur data were applied in the summer months (June, July, and August). For the remaining months, the average of the January and July sulfur content values were applied. Table 3-17 lists the diesel fuel survey cities and the 2000 winter and summer diesel sulfur values obtained for these cities, along with the spring and fall sulfur values calculated from the winter and summer data.

The method for mapping fuel values follows the basic procedure that EPA developed for allocating RVP that is described in previous Trends/NEI report (EPA, 2004a). The method is based on assigning a single set of monthly fuel sulfur data to each State, either from a single survey city which represents the State or from the weighted average of nearby cities. The same set of fuel values for the State is then assigned to every county in the State in the NCD.

Table 3-18 shows the weighting from each of the survey cities in a given State. Note that the diesel fuel survey includes fewer cities than the Alliance gasoline surveys. Thus, there are several surrogate city assignments from the original RVP work that have no matching surveyed city in the diesel sulfur data. In these cases, the average values from all of the surveyed cities were used. These values are shown in Table 3-17 in the row labeled “Average US.”

For example, Table 3-18 shows that two of the survey cities would be mapped to Alabama--city 2 (Atlanta) gets a weight of 3 and city 16 (Average U.S.) gets a weight of 1. Therefore, Alabama’s diesel sulfur would be calculated by the following equation:

*((3 * Atlanta diesel sulfur content) + (1 * Average US diesel sulfur content))/(3+1)*

Table 3-17. Survey Cities and 2000 Diesel Sulfur Values

Survey City Index	Survey City	2000 Diesel Fuel Sulfur Content (ppm)		
		Winter	Summer	Fall and Spring
1	Albuquerque, NM	330	300	315
2	Atlanta, GA	340	400	370
4	Billings, MT	330	300	315
5	Boston, MA	340	400	370
6	Chicago, IL	350	400	375
7	Cleveland, OH	320	300	310
9	Denver, CO	360	400	380
10	Detroit, MI	350	400	375
11	Kansas City, MO	370	400	385
13	Los Angeles, CA	120	100	110
14	Miami, FL	360	400	380
15	Minneapolis/St. Paul	290	300	295
17	New York City, NY	340	300	320
18	Philadelphia, PA	280	300	290
21	San Antonio, TX	400	300	350
23	Seattle, WA	300	300	300
24	St. Louis, MO	320	300	310
All others	Average US	324	329	326

Table 3-18. City Mapping and Weights for Diesel Sulfur

State Abbreviation	State FIPS	City Index	Weight
AL	1	2	3
AL	1	16	1
AK	2	26	2
AZ	4	19	1
AR	5	24	1
CA	6	13	5
CO	8	9	5
CT	9	5	2
CT	9	17	1
DE	10	18	2
DC	11	25	1
FL	12	14	3
GA	13	2	2
HI	15	27	1
ID	16	4	1
ID	16	23	1
IL	17	6	1

State Abbreviation	State FIPS	City Index	Weight
IL	17	24	1
IL	17	24	1
IN	18	6	1
IN	18	7	7
IA	19	15	1
KS	20	11	1
KY	21	2	1
KY	21	6	1
KY	21	7	6
KY	21	24	1
KY	21	28	1
LA	22	16	3
ME	23	5	6
ME	23	28	1
MD	24	18	2
MD	24	25	2
MA	25	5	5
MI	26	10	4
MN	27	15	2
MS	28	24	1
MO	29	11	1
MO	29	24	1
MT	30	4	2
NE	31	11	1
NE	31	15	1
NV	32	12	1
NV	32	22	1
NH	33	5	3
NJ	34	17	1
NJ	34	18	2
NJ	34	28	1
NM	35	1	1
NY	36	17	2
NY	36	28	7
NC	37	2	5
ND	38	15	1
OH	39	7	10
OH	39	10	1
OH	39	28	1
OK	40	11	1
OK	40	24	1
OR	41	22	2

State Abbreviation	State FIPS	City Index	Weight
OR	41	23	2
PA	42	7	2
PA	42	18	2
PA	42	28	8
RI	44	5	1
SC	45	2	5
SD	46	15	1
TN	47	2	4
TN	47	24	1
TX	48	1	1
TX	48	16	2
TX	48	16	2
TX	48	21	1
UT	49	9	2
VT	50	15	1
VA	51	2	2
VA	51	25	3
WA	53	23	4
WV	54	7	4
WV	54	28	3
WI	55	6	4
WI	55	15	7
WY	56	4	1
WY	56	9	1
PR	72	14	1
VI	78	14	1

The weight numbers were originally determined based on a list that OTAQ derived which mapped Alliance survey cities to each non-attainment area in the country, as well as some additional metropolitan areas. The weight for a given survey city was determined by adding up the number of areas in the State that had that survey city mapped to it.

3.2.3.2.2 Diesel Sulfur Contents for Nonroad Vehicles

For nonroad engines, the version of NMIM used for the 2005 NEI reflects a difference in the sulfur content of diesel fuel used by recreational marine engines compared to the sulfur content of diesel fuel used by other nonroad engines in the county. For California, a 120 ppm diesel sulfur content, much lower than the national average, was assumed for nonroad engines in all counties. Diesel sulfur values by category and by State are listed in Table 3-19. These values are based on the regulatory impact analyses performed for the Clean Air Diesel Rule (EPA, 2004b).

Table 3-19. Nonroad Diesel Sulfur Levels by Category and by State

State	Land-Based Diesel Equipment Fuel Sulfur Level, ppm	Recreational Marine Diesel Equipment Fuel Sulfur Level, ppm
Alaska	2570	2570
California	120	120
Hawaii	2381	2421
All Other States	2457	2765

3.2.3.2.3 Natural Gas Sulfur Content

The sulfur content of natural gas was assumed to be 30 ppm in both Version 1 and 2 of the 2005 NEI inventories.

3.2.4 Environmental Data

Environmental data are the parameters that affect emissions which are a property of the environment in which the source is operated. The environmental parameters used in the modeling of mobile sources are ambient temperature, humidity and altitude.

3.2.4.1 Temperature and Humidity

MOBILE6 allows daily temperatures to be supplied as either minimum and maximum temperatures (as in MOBILE5) or as hourly average temperatures. However, since MOBILE6 calculates emissions separately for each hour of the day, user supplied minimum and maximum temperatures are used to internally derive hourly temperatures, using a default diurnal temperature profile, for use by MOBILE6. MOBILE6 also allows the entry of hourly relative humidity levels. The NO_x emission results from MOBILE6 are sensitive to humidity levels, and hourly humidity levels are the most accurate way to represent daily humidity. Therefore, NMIM requires that each county have both hourly average temperatures and hourly relative humidity values for each month of the year.

Temperature and relative humidity are linked, since the value of relative humidity is in units of percent, which depends on the temperature. The NCD contains a full set of default hourly average temperatures and hourly relative humidity values for each county for each month. These temperature and humidity values were derived from raw measurement data obtained from the National Climatic Data Center (NCDC). The NCDC data were obtained from stations of all classifications, including First-Order (National Weather Service), Second-Order (both Automated Surface Observing System (ASOS) and Automated Weather Observing System (AWOS)), and cooperative (local).

Population centroids (latitude and longitude) for each county were obtained from the 2000 U.S. Census. Population, rather than geographic, centroids were used to provide a reasonable estimate of where the county's vehicle miles traveled and nonroad activity would be concentrated. From each county's centroid, EPA calculated the distance and direction to each weather station. The distance was computed using the standard great circle navigation method and the constant course direction was computed using the standard rhumb line method. A rhumb line is a line on a sphere that cuts all meridians at the same angle; for example, the path taken by a ship or plane that maintains a constant compass direction. For each of the eight compass directions (octant), the stations were sorted by distance. The station closest to the centroid for each octant was chosen for further processing. If the closest station was more than 200 miles away, that octant was ignored. (Such situations occurred near the oceans and the along the Canadian and Mexican borders.) The temperatures from these eight (or fewer) stations were then averaged together using inverse-distance weighting to produce an average county temperature for each hour of the day.

Relative humidity is a calculated value that depends on both temperature and dew point. Average hourly dew points were computed employing the same octal search, inverse-distance weighting scheme as used for temperature. The relative humidity was then computed from the resulting hourly temperature and dew point pairs.

The daily temperature and dew point averages for each hour were then used to calculate adjusted monthly averages for each hour. Because minimum and maximum temperatures occur at different hours each day, the minimum of the hourly averages will be higher than the average of the daily minima, and the daily maximum of the hourly averages will be lower than the average of the daily maxima.

To avoid this narrowing of the daily temperature range, the monthly average of hourly temperatures was assumed to capture the daily temporal pattern and was mathematically stretched so that the low temperature equaled the monthly average of the daily minima and the high temperature equals the monthly average of the daily maxima, producing a set of monthly average hourly temperatures consistent with the maximum and minimum values. Not all stations record hourly temperature values, so the subset of the stations which do record hourly temperatures was used to determine the initial average temperatures in each hour for each month. The same procedure was applied to the dewpoint values. An adjusted monthly average hourly relative humidity was then calculated from the adjusted monthly average hourly temperatures and dewpoints.

The stretching algorithm used to produce the adjusted hourly temperatures and dewpoints using the maximum, minimum and hourly values is shown here:

$$T = MinT + (t-mint)*[(MaxT-MinT)/(maxt-mint)]$$

$$D = MinD + (d-mind)*[(MaxD-MinD)/(maxd-mind)]$$

where: T	=	The adjusted monthly average temperature for an hour in a month.
t	=	The average temperature for an hour in the month calculated from the hourly point measurements taken at a fixed time each hour at some stations.
MaxT	=	The monthly average daily maximum temperature using all daily maximum (peak) temperature reading from all stations.
MinT	=	The monthly average daily minimum temperature using all daily minimum (peak) temperature reading from all stations.
maxt	=	The maximum monthly average hourly temperature calculated from the maximum hourly point measurements taken at a fixed time each hour at some stations.
mint	=	The minimum monthly average hourly temperature calculated from the minimum hourly point measurements taken at a fixed time each hour at some stations.
D	=	The adjusted monthly average dewpoint for an hour in a month.
d	=	The average dewpoint for an hour in the month.
MaxD	=	The monthly average daily maximum dewpoint.
MinD	=	The monthly average daily minimum dewpoint.
maxd	=	The maximum monthly average hourly dewpoint.
mind	=	The minimum monthly average hourly dewpoint.

The determination of the default NMIM temperature and relative humidity values is discussed in more detail in the report, "Derivation of By-Month, By-County, By-Hour Temperature and Relative Humidity with Monthly Data," by Air Improvement Resources, Inc. (AIR, 2004).

EPA is confident that in most cases the default temperature and humidity values calculated from the NCDC data will be the best values to use in the inventory calculations for each county. However, EPA recognizes that there are circumstances under which these generic methods may not provide the best estimate of temperature and humidity values for a county. These circumstances include:

- The use of more local temperature and humidity measurements that are not provided to the NCDC.

- Physical characteristics of the county (such as sea shores, valleys and sudden changes in altitude) which make the centroid interpolation methodology used by EPA inappropriate.

In these cases, temperature and humidity values determined by S/L/T agencies may provide better estimates of temperatures and humidity values. For the 2005 NEI, EPA incorporated temperature and humidity data submitted by Utah for all counties in the State.

3.2.4.2 Altitude and Barometric Pressure

MOBILE6 can calculate separate emission rates for high- and low-altitude regions. Low-altitude emission factors are based on conditions representative of approximately 500 feet above mean sea level. High-altitude factors are based on conditions representative of approximately 5,500 feet above mean sea level. When high-altitude region emission factors are requested, MOBILE6 also includes vehicles that were built to meet specific high-altitude emission standards. The NCD contains an indication for each county as to whether the county should be modeled as a high altitude area. The NCD assumes that all counties in Colorado, Nevada, New Mexico and Utah (except Washington County) are high altitude areas.

When relative humidity inputs are used in MOBILE6, the user supplied relative humidity values are converted to absolute humidity for use in adjustment equations. This conversion requires values of temperature and barometric pressure. The barometric pressure is provided as a single value in inches of mercury, with valid values between 13.0 and 33.0 inches of mercury. The NCD has a barometric pressure value for each county.

The average barometric pressure value for each county was calculated for calendar year 2005 using the same octal-search, inverse-distance-squared scheme used to estimate the temperature values (see Section 3.2.4.1). All available NCDC stations were used, which included 1st and 2nd Order, AWOS, and ASOS stations. All barometric values averaged were station (actual) pressures, NOT sea level adjusted pressures. In mountainous terrain, the station pressure can vary considerably over relatively short distances due to elevation variations. Therefore, the values supplied should be used with caution in those areas.

3.2.5 Nonroad-Specific Parameters

Temperature and fuel parameters are shared by the onroad and nonroad inventory estimates and are addressed in sections 3.2.3 and 3.2.4. However, the NCD also contains fields that may be populated with the file names of external data files containing State or county data specific to nonroad. If alternate data files are not provided, NMIM uses the default NONROAD model data files. The NONROAD external data files include:

- Activity rates (including annual hours of use and load factor)
- Temporal (monthly and daily) allocations
- Source populations.
- Growth indexes
- Geographic allocations by equipment category

Many of the nonroad specific parameters are contained in the NONROAD model itself as defaults. These values may change with different versions. The 2005 NEI used the NR05c Bond Base version of NONROAD. Default values are used for nonroad specific parameters in the 2005 NEI, except where changes were submitted by S/L/T agencies. Table 3-20 details the changes provided by S/L/T agencies for use in NMIM for the final 2002 NEI. All of these external files were also used for the 2005 NEI cycle.

Table 3-20. Nonroad Specific Parameters Provided by State

State	Description	File Type
Colorado	Oil production equipment allocations.	oil
Delaware	Airport equipment allocations.	air
Delaware	Golf equipment allocations.	gc
Delaware	Household allocations.	hou
Delaware	Logging equipment allocations.	log
Delaware	Source populations.	pop
Delaware	Recreational vehicle park allocations.	rvp
Illinois	Nonroad activity	act
Illinois	Growth rates.	grw
Illinois	Source populations.	pop
Illinois	Seasonal allocations.	sea
Illinois	Inboard watercraft allocations.	wib
Illinois	Outboard watercraft allocations.	wob
Indiana	Nonroad activity	act
Indiana	Growth rates.	grw
Indiana	Source populations.	pop
Indiana	Seasonal allocations.	sea
Indiana	Inboard watercraft allocations.	wib
Indiana	Outboard watercraft allocations.	wob
Iowa	Nonroad activity	act
Iowa	Source populations.	pop
Iowa	Seasonal allocations.	sea
Iowa	Inboard watercraft allocations.	wib
Iowa	Outboard watercraft allocations.	wob
Michigan	Nonroad activity	act
Michigan	Growth rates.	grw
Michigan	Source populations.	pop
Michigan	Seasonal allocations.	sea
Michigan	Inboard watercraft allocations.	wib
Michigan	Outboard watercraft allocations.	wob
Minnesota	Nonroad activity	act
Minnesota	Growth rates.	grw
Minnesota	Seasonal allocations.	sea
Minnesota	Snowmobile allocations.	snm
Minnesota	Inboard watercraft allocations.	wib
Minnesota	Outboard watercraft allocations.	wob
Ohio	Nonroad activity	act
Ohio	Growth rates.	grw
Ohio	Source populations.	pop
Ohio	Seasonal allocations.	sea
Ohio	Inboard watercraft allocations.	wib
Ohio	Outboard watercraft allocations.	wob
Rhode Island	Source populations.	pop
Washington	Inboard watercraft allocations.	wib
Washington	Outboard watercraft allocations.	wob
Wisconsin	Nonroad activity	act
Wisconsin	Growth rates.	grw
Wisconsin	Source populations.	pop
Wisconsin	Seasonal allocations.	sea
Wisconsin	Inboard watercraft allocations.	wib
Wisconsin	Outboard watercraft allocations.	wob

3.2.6 Onroad Local Emission Control Programs

The following sections discuss several different onroad control programs that are modeled in MOBILE6/NMIM. These include inspection and maintenance, anti-tampering, low emitting vehicle, and refueling emission control (i.e., Stage II) programs. Note that any inputs provided by States for the 2002 NEI for these programs would also be modeled for the 2005 NEI. Several States submitted new or updated data for 2005, and these data are reflected as well.

3.2.6.1 Inspection and Maintenance Programs

MOBILE6 and NMIM account for local periodic inspection programs to identify and repair vehicles in need of emission related repairs, typically known as inspection and maintenance (I/M) programs. State and local agencies may supply an improved description of their I/M program. See Section 6.0 of the report, "Technical Guidance on the Use of MOBILE6.2 for Emission Inventory Preparation" for a discussion of I/M programs (EPA, 2004c).

MOBILE6 allows the description of the I/M program to be stored in an external ASCII text file, rather than included in the input command file, using the I/M DESC FILE command. I/M programs may require additional external data files which contain emission cutpoints used for IM240 tailpipe emission inspections. NMIM uses these files in the same format as used by MOBILE6. For the 2005 final NEI, the I/M program data submitted by State or local agencies to reflect improvements to I/M programs are listed in Table A-1 of Appendix A to this document.

3.2.6.2 Anti-Tampering Programs

Anti-tampering programs may be implemented by States or local areas, which involve periodic inspections to visually identify and repair vehicles with disabled emission control systems. Where they exist, MOBILE6 and the NCD account for these local programs. Section 6.12 of the report, "Technical Guidance on the Use of MOBILE6.2 for Emission Inventory Preparation" also discusses anti-tampering programs (EPA, 2004c).

Anti-tampering program information is provided to MOBILE6 using the ANTI-TAMP PROG command. NMIM uses this information in the same format as used by MOBILE6, however, it is stored in an external ASCII text file, rather than included in the input command file. The external ASCII file may also contain comment records that comply with MOBILE6 rules. One or more counties in the following States were modeled with an anti-tampering program in the 2005 NEI: Arizona, Delaware, District of Columbia, Kentucky, Maine, Maryland, Massachusetts, New Jersey, New York, Oregon, Tennessee, Texas, Utah, and Virginia. Table A-2 presents the counties for which anti-tampering program information was provided.

3.2.6.3 Low Emitting Vehicle Programs

MOBILE6 already accounts for the federal national LEV program as part of the federal motor vehicle emission compliance program. Some States have implemented an accelerated phase in for LEV vehicles, and these local programs are accounted for in the NCD. State and local agencies may supply an accelerated phase in for LEV vehicles or information to reflect improvements to their programs. Section 7.4.1 of the report, "Technical Guidance on the Use of MOBILE6.2 for Emission Inventory Preparation" addresses phase in for LEV vehicles (EPA, 2004c).

The phase in for LEV vehicles is provided to MOBILE6 using an external ASCII text file using the 94+ LDG IMP command. NMIM uses this file in the same format as used by MOBILE6. For the final 2002 NEI, no State or local agencies submitted additional information to reflect an alternate phase in for LEV vehicles.

3.2.6.4 Refueling Emission Control Programs

Stage II Gasoline Distribution encompasses the refueling of a vehicle at a gasoline service station. According to the Clean Air Act, Section 182, areas with ozone nonattainment classifications greater than Moderate were required to install vapor recovery systems at these service stations. If installed and inspected annually, a minimum of 86 percent reduction can be applied to estimated emissions using uncontrolled emission factors. The default emissions percentage is from the Control Techniques Guidance for Stage II Vapor Recovery (EPA, 1991).

A list of counties with this regulation imposed were identified for the 1999 NEI via a literature search, and is found in Table E-2 of Appendix E of the "Documentation for the Final 1999 Nonpoint Area Source National Emission Inventory for Hazardous Air Pollutants (Version 3)" (EPA, 2003d). This list was used as the basis for the list of counties used for the 2002 NEI. A copy of the list was sent to each of the ten EPA Regional offices for verification. The changes suggested by the EPA Regions are listed below.

1. Add all Vermont counties.
2. Remove Shelby County (TN).
3. Remove Kent and Queen Anne's Counties (MD).
4. Add Berks County (PA).
5. Remove all Colorado counties.
6. Remove all Utah counties.
7. Remove Maricopa County (AZ).
8. Remove Amador, Calaveras, Colusa, Del Norte, Humboldt, Lake, Lassen, Mariposa, Mendocino, Modoc, Siskiyou, Tehama and Trinity Counties (CA).
9. Remove Thurston County (WA).
10. Add Kitsap, King and Snohomish Counties (WA).
11. Add Clackamas, Multnomah and Washington Counties (OR).

While compiling the list of applicable counties for the 1999 NEI, 14 States listed vapor recovery emission reduction percentages in their State regulations greater than the default value. New

York provided a 90 percent reduction for ten counties, while the remaining 13 States provided a 95 percent reduction for 153 counties. The remaining 116 counties that have Stage II controls either listed 86 percent as their reduction percentage or did not provide a reduction percentage (in which case the 86 percent reduction was used as a default). New Jersey provided revisions to the 86 percent reduction effectiveness for the 2002 final NEI of 62 percent and 77 percent, respectively. All of the counties added for the 2002 NEI assume 86 percent effectiveness, unless other counties in that State already exist and have effectiveness values greater than 86 percent. In these cases, the added counties take on the effectiveness of the other counties in the State. For purposes of MOBILE6 modeling of Stage II controls, all counties were assumed to be completely phased in by calendar year 2002 and that the effectiveness for Stage II was the same for gasoline fueled light duty and heavy duty vehicles. For the 2005 NEI, only the State of Maine provided revisions to the Stage II effectiveness for Cumberland, Sagadahoc, and York counties. Note that different effectiveness values were provided for light duty and heavy duty vehicles.

Table A-3 of Appendix A lists the resulting 274 counties with their assumed effectiveness (refueling vapor loss emission reduction) values as used in the 2005 NEI.

3.2.7 Onroad Fleet and Activity

Fleet and activity data refer to those parameters in the model which describe the type of vehicles assumed in the fleet and their use by vehicle owners which impacts the calculation of emissions from these sources. References to MOBILE6 in this section apply to NMIM as well, since MOBILE6 is the underlying model in NMIM for onroad sources. Most of the onroad fleet and activity information used in the NEI inventory are in the format specified by MOBILE6.

There are default values for all of the fleet and activity parameters in the MOBILE6 model based on national averages and no input of these parameters is required to run the model. However, alternate values which are more representative of the local fleet and local fleet activity may be provided. More information about the scope and format of these alternate values are contained in the document, “User’s Guide to MOBILE6.1 and MOBILE6.2, Mobile Source Emission Factor Model” (EPA, 2003c). Guidance on how to obtain these values is contained in the report “Technical Guidance on the Use of MOBILE6.2 for Emission Inventory Preparation” (EPA, 2004c).

As with the onroad control programs, fleet and activity data provided by States for the 2002 NEI would also be modeled for the 2005 NEI. In addition, several States submitted updates or new data for 2005.

3.2.7.1 Age Distribution

A typical vehicle fleet includes a mix of vehicles of different ages. MOBILE6 covers a 25-year range of vehicle ages, with vehicles 25 years and older grouped together. If no alternate data are supplied, MOBILE6 will use a set of default values for these distributions. The technical report, “Fleet Characterization Data for MOBILE6” (EPA, 2001a), describes how these default values were derived.

MOBILE6 allows the user to specify the fraction of vehicles in each of 25 vehicle ages for each of the 16 vehicle classes (combined gasoline and diesel) in the model. This requires that an external data file be provided containing the alternate values.

The NMIM model runs for the NEI all used the default MOBILE6 registration distribution, except where alternate distributions were provided by S/L/T agencies. Age distributions were provided for at least some counties in Arizona, Delaware, District of Columbia, Illinois, Iowa, Kentucky, Maryland, Massachusetts, Minnesota, New Jersey, New York, Ohio, Oregon, Rhode Island, Tennessee, Texas, Utah, Vermont, Virginia, Washington, and Wisconsin.

Table A-4 of Appendix A indicates which counties used default distributions and which counties used S/L/T supplied distributions.

To determine whether the default MOBILE6 registration distribution would be appropriate to apply in Puerto Rico and the Virgin Islands, data available from Puerto Rico listing new vehicle sales and the total number of vehicle registrations, both by model year, was examined and compared to national trends in the United States. Table A-5 in Appendix A has the 25-year trend of vehicle sales and registrations in Puerto Rico.

Based on comparisons made between this list and the national trend, and without more specific data, it was determined that the default MOBILE6 registration distribution would sufficiently represent Puerto Rico and the Virgin Islands.

3.2.7.2 Diesel Sales Fractions

Within any vehicle class, diesel and gasoline vehicles have distinctly different emission rates. Diesel fractions allow the model to separate gasoline and diesel vehicles within a vehicle class. MOBILE6 includes default diesel sales fractions for 14 of the 16 composite vehicle classes - all except urban/transit buses, which are assumed to be all diesel-fueled, and motorcycles, which are assumed to be all gasoline-fueled. MOBILE6 projects future diesel fractions as constant beginning with the 1996 model year. Users can enter alternative diesel fractions for these 14 vehicle classes for each of 25 vehicle ages in any calendar year. The derivation of the default diesel sales fractions is found in the report “Fleet Characterization Data for MOBILE6” (EPA, 2001a).

The final 2005 NEI inventories used the default MOBILE6 assumptions regarding diesel sales fractions by model year and vehicle type, except for the changes submitted by S/L/T agencies. Diesel sales fractions were provided for at least some counties in Arizona, District of Columbia, Iowa, Maryland, Minnesota, New Jersey, New York, Texas and Virginia. Table A-6 presents the counties for which alternate diesel sales fractions were provided.

3.2.7.3 Average Speeds

MOBILE6 uses VMT distribution over preselected average speed ranges. MOBILE6 calculates these distributions for each of the 24 hours of the day and for freeways and arterials (producing 48 separate distributions, each containing 14 fractions). The data in this array only specify the average speeds on the roadway types at a particular time of day. The data do not affect either the hourly VMT distribution or the VMT distributions by facility type.

NMIM does not use the default average speed distributions found in MOBILE6. Instead a separate single average speed is used, depending on the vehicle class and roadway type. Every combination of vehicle class grouping and roadway type does not have an independent average speed estimate.

There are four MOBILE6 roadway types: freeways, arterials, locals, and freeway ramps. The 12 roadway types shown in Table A-5 were assigned to one of these MOBILE6 roadway types based on EPA guidance. The MOBILE6 freeway roadway type was assigned to rural interstates, urban interstates, and urban other freeways and expressways. Each roadway assigned to the MOBILE6 freeway roadway type also assume that the average speed includes the effects of freeway ramps and that ramps account for 8 percent of travel on these roadways. The MOBILE6 arterial roadway type was assigned to rural other principal arterials, rural minor arterials, rural major collectors, rural minor collectors, rural locals, urban other principal arterials, urban minor arterials, and urban collectors. Urban local roadways are modeled using the “Local” roadway category of MOBILE6, with an average speed of 12.9 mph. The average speed of this roadway type cannot be varied, since the emission factors modeled on the MOBILE6 local roadway type do not vary by average speed. The groupings of vehicle class groups and roadway types is explained in more detail in Section 3.1 above.

The default average speeds represent the average speeds that had been modeled nationally in prior years of the Trends analysis. Table A-7 shows the default average speed used for each of the 12 roadway types for each of the vehicle class groupings for the final 2002 NEI.

The 2005 NEI used the same set of average speeds for each roadway type and vehicle class grouping, except for the changes submitted by S/L/T agencies. Average speed information was provided for at least some counties in Delaware, District of Columbia, Iowa, Maryland, New Jersey, New Mexico, Rhode Island, Utah, and Virginia. Table A-8 presents the counties for which alternate average speed distributions were provided.

3.2.7.4 Annual Mileage Accumulation Rates

The annual mileage accumulation rate represents the total annual travel accumulated per vehicle of a given age and individual vehicle class. Vehicles accumulate mileage at different rates depending on the type and age of the vehicle. Trucks tend to be driven more miles per year than cars. Older vehicles tend to be driven fewer miles per year than newer ones. Annual mileage accumulation affects the rate at which vehicle emission controls deteriorate and affect the relative emissions contributions of newer and older vehicles to fleet emissions. Vehicles with higher total mileage accumulation will tend to have higher emission rates, however, older vehicles tend to travel fewer miles each year. Annual mileage accumulation rates are also used in MOBILE6 to determine the daily vehicle miles traveled per vehicle. This estimate is used to convert daily emissions in grams per day from engine starts, hot soaks, diurnal losses, resting losses and refueling to units of grams per mile of vehicle travel.

The derivation of the default annual mileage accumulation rates is found in the report, "Fleet Characterization Data for MOBILE6" (EPA, 2001a).

The 2005 NEI used the default MOBILE6 assumptions regarding annual mileage accumulation rates by model year and vehicle class, except for the changes submitted by S/L/T agencies. Only the State of New York provided alternate annual mileage accumulation rates for use in NMIM.

3.2.7.5 Trips Per Day

The nearly uncontrolled exhaust emissions that occur immediately after a cold engine start can account for a significant fraction of the emissions that occur during a vehicle trip. There will be at least one engine start for each vehicle trip, so this parameter is also called starts per day. Only light duty vehicles (passenger cars), light duty trucks and motorcycles account for engine starts separately in MOBILE6. The emission rates for heavy duty vehicles and buses include the effects of engine starts and the number of engine starts and the soak time distribution cannot be changed by the user for these vehicle classes.

The derivation of the default values for the number of vehicle trips per day is found in the report "Soak Length Activity Factors for Start Emissions" (EPA, 2002b). Although MOBILE6 allows the number of trips per day to vary by vehicle age, all default values are the same for all vehicle ages.

The 2005 NEI inventories used the default MOBILE6 assumptions regarding vehicle trips per day rates by vehicle class. No changes for light duty vehicles, light duty trucks or motorcycles were submitted by S/L/T agencies.

3.2.7.6 Trip Length Distribution

Fuel evaporation occurs during trips due to the heating of the fuel system, especially including the fuel tank. These emissions are affected by the length of time the vehicle has been in operation. Longer trips mean more evaporative running loss emissions due to increased fuel system temperatures. Only gasoline fueled vehicles (not including motorcycles) are affected by the distribution of trip lengths in MOBILE6. Diesel vehicles and natural gas vehicles are assumed to have negligible evaporative running loss emissions.

The derivation of the default values for the trip length distributions is found in the report "Trip Length Activity Factors for Running Loss and Exhaust Running Emissions" (EPA, 2001b). The same distribution of vehicle trip lengths is used for all vehicle classes for all hours of the day, for both weekdays and weekend days.

The 2005 NEI inventories used the default weekday MOBILE6 assumptions regarding the trip length distributions, except for the changes submitted by S/L/T agencies. Trip length data were provided for at least some counties in District of Columbia, Maryland, Texas, and Virginia. Table A-9 lists the counties for which alternate trip length distributions were provided.

3.2.7.7 Hourly Distribution of Engine Starts

MOBILE6 distributes the daily number of engine starts across the hours of the day. The same distribution is used for all vehicle classes, although there are different distributions for weekdays and weekend days. Only light duty vehicles (passenger cars), light duty trucks and motorcycles account for engine starts separately. The emission rates for heavy duty vehicles and buses include engine starts and these emission rates are not affected by changes in the distribution of engine starts across the hours of the day.

The derivation of the default values for the distribution of engine starts across the hours of the day is found in the report "Soak Length Activity Factors for Start Emissions" (EPA, 2002b).

The 2005 NEI inventories used the default weekday MOBILE6 assumptions regarding the distribution of engine starts across the hours of the day, except for the changes submitted by S/L/T agencies. Only the State of New York provided an alternate hourly distribution of engine starts.

3.2.7.8 Hourly Distribution of Vehicle Miles Traveled

MOBILE6 distributes the estimate for daily vehicle miles traveled across the hours of the day. There are separate distributions for the freeway, arterial/collector and local roadway classifications. The same distribution is used for all vehicle classes, although there are different distributions for weekdays and weekend days.

The derivation of the default values for the distribution of vehicle miles traveled across the hours of the day is found in the report "Development of Methodology for Estimating VMT Weighting by Facility Type" (EPA, 2001c).

The 2005 NEI inventories used the default weekday MOBILE6 assumptions regarding the distribution of vehicle miles traveled across the hours of the day, except for the changes submitted by S/L/T agencies. Hourly distributions for daily vehicle miles traveled were provided for at least some counties in Illinois, New York, Texas, and Utah. Table A-10 lists the counties which provided alternate distributions for vehicle miles traveled across the hours of the day.

3.2.7.9 Soak Time Distribution

Soak time is defined as the time between when the engine is turned off to the next time it is restarted. The soak time can have a significant effect on the emissions associated with an engine start. MOBILE6 contains default values for the distribution of the soak times before an engine start by hour of the day. The same soak time distributions are applied to all vehicle classes and all vehicle ages. Only light duty vehicles (passenger cars), light duty trucks and motorcycles account for engine starts separately. The emission rates for heavy duty vehicles and buses include engine starts and changing the soak time distribution does not affect their emissions.

The derivation of the default values for the distribution of vehicle miles traveled across the hours of the day is found in the report "Soak Length Activity Factors for Start Emissions" (EPA, 2002b).

The 2005 NEI inventories used the default MOBILE6 assumptions regarding soak times by hour of the day. No changes for light duty vehicles, light duty trucks or motorcycles were submitted by S/L/T agencies.

3.2.7.10 Diurnal Activity Distribution

While the engine is shut down (key off) and during times of day when the ambient temperature is rising, fuel vapors will be driven off the vehicle from the increasing temperature of the fuel in the tank and other locations on the vehicle. The ability of the vehicle emission control components to adsorb these vapors depends on how long the vehicle has been subjected to diurnal emission generation. The resulting hydrocarbon losses are referred to as diurnal emissions. If the vehicle is restarted, the active emission control systems begin again and the full diurnal effect is interrupted, resulting in fewer diurnal emissions. MOBILE6 contains default values for the distribution of the diurnal soak time by hour of the day.

Only gasoline fueled vehicles are affected by the diurnal soak activity. Diesel vehicles and natural gas vehicles are assumed to have negligible diurnal evaporative emissions. The same distribution of diurnal soak times is used for all vehicle classes.

The derivation of the default values for the distribution of diurnal soak activity across the hours of the day is found in the report, "Soak Length Activity Factors for Diurnal Emissions" (EPA, 2001d).

The 2005 NEI inventories used the default MOBILE6 assumptions regarding the distribution of evaporative diurnal activity. No changes were submitted by S/L/T agencies.

3.2.7.11 Hot Soak Distribution

Immediately after an engine is shut down (key off), while the engine is still hot, fuel vapors in the intake manifold and other locations in the fuel system are driven off the vehicle by the heat of the engine. These hydrocarbon losses are referred to as hot soak emissions. If the vehicle is restarted, the active emission control systems begin again and the full hot soak effect is interrupted, resulting in fewer hot soak emissions. MOBILE6 contains default values for the distribution of the hot soak time after an engine shut down by hour of the day. The actual number of hot soaks that occur is a function of the number of engine starts per day that occur. Changing the number of engine starts per day will automatically change the number of hot soaks in a day. The number of engine starts (trips) per day is discussed in Section 3.2.7.5 above.

Only gasoline fueled vehicles are affected by the hot soak activity. Diesel vehicles and natural gasoline vehicles are assumed to have negligible hot soak evaporative emissions. The same distribution of hot soak times is used for all vehicle classes.

The derivation of the default values for the distribution of the hot soak time by hour of the day is found in the report, “Soak Length Activity Factors for Hot Soak Emissions” (EPA, 2001e).

The 2005 NEI inventories used the default MOBILE6 assumptions regarding the distribution of hot soak times. No changes were submitted by S/L/T agencies.

3.2.8 NMIM Toxic Emission Factors

The hazardous air pollutants for which inventories are produced by NMIM are listed in Table 3-4 above. The “six HAPs” are produced internally by MOBILE6. In all other cases, as indicated in the “Pollutants” section above, HAP inventories were generated by ratios to various MOBILE6 and NONROAD outputs.

HAPs are estimated using data sources and methods developed for the 1999 NEI for HAPs, version 3 (EPA, 2003e; EPA, 2004a), with some modifications, described below. NMIM does not estimate HAP emissions for CNG engines.

HAPs are estimated in NMIM using one of three approaches:

1. Gaseous HAPs – Apply toxic to VOC ratios to VOC estimates.

2. Poly-Aromatic Hydrocarbons (PAHs) – Apply toxic to PM10 ratios to PM10 estimates.

3. Metals, Dioxins and Furans – For NONROAD, multiply HAP gram per gallon emission factors by county level fuel consumption estimates. For MOBILE6, multiply HAP gram per mile emission factors by county level VMT estimates.

The NCD SCCToxics table provides a complete listing of toxic ratios and emission factors for all SCCs and fuel combinations. The above approaches are described in more detail in the following sections.

3.2.8.1 Gaseous HAPs

NMIM uses the toxic to VOC ratios described in the documentation for the 1999 NEI for HAPs, version 3, and summarized in Volume 1, Appendix D, Table 1 (EPA, 2003e). Separate ratios are used for evaporative and exhaust emissions for each of the following four categories of gasoline blends:

1. Baseline Gasoline. All cases that do not fall into categories 2-4 below. Ratios are in variables “ExhBaseGas” and “EvapBaseGas” in the SCCToxics table.

2. WO (Winter Oxygenate) Gasoline/ETBE - used where the fuel contains ethanol which is greater than or equal to 5 percent by volume or ETBE greater than or equal to 5 percent by volume. Ratios are in variables "ExhEthGas" and "EvapEthGas" in the SCCToxics table.

3. WO Gasoline/ethanol or MTBE/TAME - used where the fuel contains MTBE which is greater than or equal to 12 percent by volume or TAME greater than or equal to 13 percent by volume. Ratios are in variables "ExhMTBEGas" and "EvapMTBEGas" in the SCCToxics table.

4. RFG/MTBE/TAME - Used where the fuel is RFG and where the fuel contains oxygenate greater than 5 percent by volume and where the fuel contains MTBE which is less than 12 percent by volume or TAME less than 13 percent by volume. Ratios are in variables "ExhRFGGas" and "EvapRFGGas" in the SCCToxics table.

It should be noted that NMIM uses a different set of criteria to determine which toxic to VOC ratios to use than that used in the 1999 NEI final version 3 for HAPs. In the 1999 NEI inventory, ratios for different fuel types were weighted according to whether the county participated in the Federal or California Reformulated Gasoline Program or a winter oxygenated fuel program, and the percentage of the year the county participated in these programs. For example, if a county participated in the Federal Reformulated Gasoline Program for 4 months, the RFG/MTBE/TAME fraction would be weighted by a factor of 0.33, and the baseline fraction by 0.67 to develop a composite annual fraction, which would then be applied to VOC. This approach does not adequately account for reformulated and oxygenated gasoline use outside counties participating in the program, or use outside the fuel program season. One result is an underestimate of the nonroad MTBE inventory. Thus, when comparing the unofficial NMIM 1999 estimates with those of the 1999 NEI, NMIM estimates for 1999 result in substantially higher nationwide MTBE than those in the 1999 NEI for HAPs.

In some cases, HAP profiles for specific nonroad equipment and engine type combinations are available. However, for many equipment/engine type combinations, no speciation data are available. In such instances, default values for 2-stroke gasoline engines, 4-stroke gasoline engines, and diesel engines are used. These default values represent an average fraction for various equipment types within an engine category.

3.2.8.2 PAHs

All PAHs emitted in exhaust are estimated as fractions of PM10, although the data used to calculate mass ratios includes both gas and particle phase PAH emissions. The data used to develop the PAH fractions are described in the documentation for the 1999 NEI for HAPs. Evaporative naphthalene emissions from onroad vehicles is estimated as a fraction of VOC. NMIM does not currently estimate evaporative naphthalene emissions for nonroad equipment.

3.2.8.3 Metals, Dioxins, and Furans

For metals, dioxins, and furans, NMIM estimates onroad emissions using g/mile emission factors developed for the 1999 NEI for HAPs, version 3.

The approach used by NMIM to estimate nonroad county-level metal emissions differs in a number of respects from the approach used in the 1999 NEI for HAPs, version 3. In the 1999 NEI, nationwide metal emissions for gasoline engines were obtained by applying a mass per gallon emission factor by nationwide gasoline consumption from the NONROAD model. For diesel engines, a mass per brake-horsepower emission factor was multiplied by nationwide energy output. The resultant nationwide emission estimates were then spatially allocated to counties relative to the county proportion of PM10 emissions compared to the national PM10 emissions, as obtained from the NONROAD model.

In contrast, NMIM multiplies mass per gallon emission factors for gasoline engines by county level fuel consumption to obtain a county level inventory estimate. For diesel engines, mass per brake horsepower emission factors were converted to mass per gallon emission factors using the following equation:

*grams per gallon = (micrograms per brake-horsepower hour (μg/bhphr) * average fuel density (lb/gallon))/fuel consumption per brake-horsepower hour (lb fuel/bhphr)*1,000,000*

where:

average fuel density	= 7.01 lb/gal
fuel consumption per brake horsepower hour	= 0.408 lb for engines less than 100 hp
	= 0.367 lb for engines greater than 100 hp

The fuel consumption per brake horsepower hour estimates are from the NONROAD model (EPA, 2002c). The gram per gallon metal emission factors for gasoline and diesel engines are contained in the NCD SCCToxics table.

Mass per gallon emission factors for dioxins and furans from nonroad engines were calculated by multiplying the onroad vehicle emission factors in grams per mile by fleet average fuel economy estimates. The assumed fuel economy for gasoline vehicles was 21.5 miles per gallon; for diesel vehicles it was 7 miles per gallon. Resulting gram per gallon emission factors are contained in the NCD SCCToxics table.

4.0 2002 MOBILE STAGE II REFUELING NEI

This section describes how Stage II emission estimates related to onroad mobile and nonroad mobile refueling were estimated, and how they were reported in the 2005 NEI. No updates were made to the Stage II emissions reported in the 2002 NEI for the final 2005 NEI.

4.1 HOW WERE STAGE II ONROAD REFUELING EMISSIONS DEVELOPED?

The EPA developed onroad Stage II refueling emission estimates for VOC, benzene, and MTBE based on the results of the draft NEI 2002 NMIM runs. These estimates were not updated for Version 3 of the 2002 NEI. NMIM/MOBILE6 calculates Stage II emissions using a base uncontrolled displacement EF of 5.46 grams/gallon HC, and a base uncontrolled spillage EF of 0.31 grams/gallon HC. These emission factors are then adjusted for temperature and RVP, and are converted from HC to VOC within MOBILE6. For a description of the counties with Stage II control programs, as well as the assumed control efficiency for the program, see section 3.2.6.4.

For several other HAPs, EPA applied national HAP speciation profiles to the VOC emission estimates from NMIM. These HAPs are listed in Table 4-1, along with their emission factors (MACTEC, 2004).

Table 4-1. Stage II HAP Speciation Profiles Applied to VOC Emissions

Pollutant	Emission Factor
2,2,4-Trimethylpentane	0.827% of VOC
Cumene	0.01% of VOC
Ethyl Benzene	0.138% of VOC
Hexane	1.589% of VOC
Naphthalene	0.046% of VOC
Toluene	1.290% of VOC
Xylenes	0.530% of VOC

4.2 HOW WERE STAGE II NONROAD REFUELING EMISSIONS DEVELOPED?

NMIM/NONROAD accounts for refueling emissions from nonroad equipment under two separate components, vapor displacement and spillage. The procedures that NONROAD uses to estimate refueling emissions are documented in the EPA report, “Refueling Emissions for Nonroad Engine Modeling” (EPA, 2004d). For both spillage and vapor displacement, NONROAD incorporates emission factor values in terms of grams of emissions per gallon of fuel consumed. Fuel consumption is then used to calculate total emissions based on the g/gal emissions factors. Nonroad equipment may be fueled from a gasoline pump or a portable container. Stage II nonroad emissions are associated with nonroad equipment being filled directly at the gasoline pumps. Because the different refueling modes result in different emissions, NONROAD includes assumptions concerning which equipment will be refueled predominantly using a gasoline pump and which will be refueled predominantly from a portable container. In general, gasoline-powered equipment with larger horsepower engines are fueled at the pump while equipment with smaller horsepower engines are fueled with a container. Both Stage II and portable fuel container components may be included in the SCC-level vapor displacement and spillage emissions output of NMIM (depending on the SCC). As such, Stage II emissions were not subtracted out of the NONROAD model emission estimates and unlike Stage II onroad emissions, were not reported as part of the area source inventory.

4.3 REPORTING OF MOBILE STAGE II REFUELING

Nonroad Stage II emissions were included in all relevant nonroad gasoline SCCs that have engines assumed to be refueled at a gasoline pump. Onroad Stage II emissions are reported under the SCC 22501060100 (Petroleum and Petroleum Product Storage, Gasoline Service Stations, Stage 2: Total) in the non-point source inventory. It should be noted that Stage II vehicle refueling emissions may also be reported in the point source inventory under the following SCCs:

Point Source SCCs	Description
40600401	Filling Vehicle Gas Tanks - Stage II, Vapor Loss w/o Controls
40600402	Filling Vehicle Gas Tanks - Stage II, Liquid Spill Loss w/o Controls
40600403	Filling Vehicle Gas Tanks - Stage II, Vapor Loss w/o Controls
40600499	Filling Vehicle Gas Tanks - Stage II, Not Classified **
40600601	Consumer (Corporate) Fleet Refueling - Stage II, Vapor Loss w/o Controls
40600602	Consumer (Corporate) Fleet Refueling - Stage II, Liquid Spill Loss w/o Controls
40600603	Consumer (Corporate) Fleet Refueling - Stage II, Vapor Loss w/ Controls

Refueling emissions based on the 2005 NMIM runs were not included in the 2005 NEI. For purposes of the 2005 NEI, refueling emissions developed for the 2002 NEI were substituted.

4.4 QA PROCEDURES

Spot checks were performed of the onroad Stage II HAP emission estimates developed using the speciation profiles listed in Table 4-1. In addition, onroad Stage II emissions were subject to additional S/L/T review, facilitated by emission summaries that compared the newly-developed Stage II emissions to the draft NEI emission estimates. Nonroad Stage II emissions were subject to the same QA procedures as NONROAD model exhaust and evaporative emission estimates.

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APPENDIX A. LOCAL DATA FOR NMIM COUNTY DATABASE

Table A-1. List of I/M Program File Names Used for Version 2 of the 2005 National Emission Inventory

State	Filename	First Year	Last Year	Counties
ALASKA	0202099.imp	1999	2050	20
ALASKA	0209099.imp	1999	2050	90
ARIZONA	0401395.imp	1999	2001	13
ARIZONA	0401301.imp	2002	2004	13
ARIZONA	0401305.imp	2005	2050	13
ARIZONA	0401902.imp	1999	2050	19
CALIFORNIA	0600199.imp	1999	2050	1,13,41,55,75,81,95
CALIFORNIA	0607999.imp	1999	2050	7,11,17,19,21,29,31,37,39,47,53,57, 59,61,65,67,69,71,73,77,79,83,85, 87,89,97,99,101,103,107,111,113,115
COLORADO	0800199.imp	1999	2050	1,5,13,14,31,35,59
COLORADO	0804199.imp	1999	2050	41,69,97,123
CONNECTICUT	0900199.imp	1999	2050	1,3,5,7,9,11,13,15
DELAWARE	1000191.imp	1999	2050	1
DELAWARE	1000383.imp	1999	2050	3
DELAWARE	1000591.imp	1999	2050	5
DISTRICT OF COLUMBIA	1100102.imp	1999	2002	1
DISTRICT OF COLUMBIA	1100103.imp	2003	2003	1
DISTRICT OF COLUMBIA	1100105.imp	2004	2050	1
FLORIDA	1200099.imp	1999	2050	11,31,57,86,99,103
GEORGIA	1305799.imp	1999	1999	57,63,77,97,113,117,151,223,247
GEORGIA	1305700.imp	2000	2001	57,63,77,97,113,117,151,223,247
GEORGIA	1305702.imp	2002	2050	57,63,77,97,113,117,151,223,247
GEORGIA	1306799.imp	1999	1999	67,89,121,135
GEORGIA	1306700.imp	2000	2001	67,89,121,135
GEORGIA	1306702.imp	2002	2050	67,89,121,135
IDAHO	1600099.imp	1999	2050	1
ILLINOIS	1700099.imp	1999	2001	31,43,63,89,93,97,111,119,133,163,197
ILLINOIS	1700002.imp	2002	2050	31,43,63,89,93,97,111,119,133,163,197
INDIANA	1806101.imp	2001	2050	61
INDIANA	1808997.imp	1999	2050	19,43,89,127
KENTUCKY	2111198.imp	1999	2001	15,37,111,117
KENTUCKY	2111102.imp	2002	2050	15,37,111,117
LOUISIANA	2200000.imp	2000	2050	33,121
MAINE	2300599.imp	1999	2004	5
MAINE	2300505.imp	2005	2050	5
MARYLAND	2400995.imp	1999	2002	9,15,17,21,35
MARYLAND	2400903.imp	2003	2050	9,15,17,21,35
MARYLAND	2400002.imp	1999	2002	3,5,13,25,27,31,33,43,510
MARYLAND	2400003.imp	2003	2004	3,5,13,25,27,31,33,43,510
MARYLAND	2400305.imp	2005	2050	3,5,9,13,15,17,21,25,27,31,33,35,43,510
MASSACHUSETTS	2500099.imp	1999	1999	1,3,5,7,9,11,13,15,17,19,21,23,25,27
MASSACHUSETTS	2500000.imp	2000	2002	1,3,5,7,9,11,13,15,17,19,21,23,25,27
MASSACHUSETTS	2500003.imp	2003	2050	1,3,5,7,9,11,13,15,17,19,21,23,25,27
MINNESOTA	2700099.imp	1999	2050	3,19,37,53,123,139,163,171
MISSOURI	2900099.imp	1999	2050	71,99,183,189,510
NEVADA	3200099.imp	1999	2050	3,31
NEW HAMPSHIRE	3300002.imp	2002	2050	11,15,17

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NEW JERSEY	3400199.imp	1999	1999	1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31, 33,35,37,39,41
NEW JERSEY	3400100.imp	2000	2004	1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31, 33,35,37,39,41
NEW JERSEY	3400105.imp	2005	2050	1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31, 33,35,37,39,41
NEW MEXICO	3500189.imp	1999	2002	1
NEW MEXICO	3500103.imp	2003	2050	1
NEW YORK	3600101.imp	1999	2002	1,3,7,9,11,13,15,17,19,21,23,25,27,29,31, 33,35,37,39,41,43,45,49,51,53,55,57,63,65, 67,69,71,73,75,77,79,83,89,91,93,95,97, 99,101,105,107,109,111,113,115,117,121,123
NEW YORK	3600103.imp	2003	2050	1,3,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35, 37,39,41,43,45,49,51,53,55,57,63,65,67,69,71, 73,75,77,79,83,89,91,93,95,97,99,101,105, 107,109,111,113,115,117,121,123
NEW YORK	3600599.imp	1999	2002	5,47,59,61,81,85,87,103,119
NEW YORK	3600503.imp	2003	2050	5,47,59,61,81,85,87,103,119
NORTH CAROLINA	3702501.imp	2001	2050	25,135,179
NORTH CAROLINA	3705792.imp	1999	2050	57,59,63,67,71,77,81
NORTH CAROLINA	3711983.imp	1999	2050	119
NORTH CAROLINA	3718387.imp	1999	2050	183
OHIO	3905596.imp	1999	2002	17,23,35,55,57,61,85,93,113,133,153,165
OHIO	3905503.imp	2003	2050	17,23,35,55,57,61,85,93,113,133,153,165
OHIO	3910398.imp	1999	2002	25,103
OHIO	3910303.imp	2003	2050	25,103
OREGON	4100597.imp	1999	2000	5,51,67
OREGON	4100501.imp	2001	2050	5,51,67
OREGON	4100901.imp	2001	2050	9,71
OREGON	4102997.imp	1999	2000	29
OREGON	4102901.imp	2001	2050	29
PENNSYLVANIA	4201797.imp	1999	2050	17,29,45,91,101
PENNSYLVANIA	4201101.imp	2001	2050	11,13,21,27,41,43,49,69,71,75,79,81,85,133
PENNSYLVANIA	4200397.imp	1999	2050	3,7,73,125,129
PENNSYLVANIA	4207785.imp	1999	2050	77,95
RHODE ISLAND	4400002.imp	1999	2050	1,3,5,7,9
TENNESSEE	4703785.imp	1999	2050	37
TENNESSEE	4714995.imp	1999	2050	149,165,187,189
TENNESSEE	4715784.imp	1999	2050	157
TEXAS	4808500.imp	2000	2001	85,121
TEXAS	4808502.imp	2002	2050	85,121
TEXAS	4811390.imp	1999	2001	113,439
TEXAS	4811302.imp	2002	2050	113,439
TEXAS	4814102.imp	1999	2050	141
TEXAS	4820197.imp	1999	2001	201
TEXAS	4820102.imp	2002	2050	201
TEXAS	4803902.imp	2000	2050	39,71,157,167,291,339,473
UTAH	4901197.imp	1999	2050	11
UTAH	4903502.imp	1999	2002	35
UTAH	4903503.imp	2003	2004	35
UTAH	4903505.imp	2005	2050	35
UTAH	4904986.imp	1999	2001	49
UTAH	4904902.imp	2002	2004	49

Table A-1. List of I/M Program File Names Used for Version 2 of the 2005 National Emission Inventory

UTAH	4904905.imp	2005	2050	49
UTAH	4905792.imp	1999	2001	57
UTAH	4905702.imp	2002	2004	57
UTAH	4905705.imp	2005	2050	57
VERMONT	5000097.imp	1999	2001	1,3,5,7,9,11,13,15,17,19,21,23,25,27
VERMONT	5000002.imp	2002	2050	1,3,5,7,9,11,13,15,17,19,21,23,25,27
VIRGINIA	5101302.imp	1999	2004	13,59,153,510,600,610,683,685
VIRGINIA	5101305.imp	2005	2050	13,59,153,510,600,610,683,685
VIRGINIA	5110702.imp	1999	2004	107,179
VIRGINIA	5110705.imp	2005	2050	107,179
WASHINGTON	5301198.imp	1999	2001	11
WASHINGTON	5301102.imp	2002	2050	11
WASHINGTON	5303382.imp	1999	2001	33
WASHINGTON	5303302.imp	2002	2050	33
WASHINGTON	5305393.imp	1999	2001	53
WASHINGTON	5305302.imp	2002	2050	53
WASHINGTON	5306193.imp	1999	2001	61
WASHINGTON	5306102.imp	2002	2050	61
WASHINGTON	5306385.imp	1999	2001	63
WASHINGTON	5306302.imp	2002	2050	63
WISCONSIN	5505984.imp	1999	2000	59,79,89,101,131,133
WISCONSIN	5505902.imp	2001	2050	59,79,89,101,131,133
WISCONSIN	5511794.imp	1999	2000	117
WISCONSIN	5511702.imp	2001	2050	117

Table A-2. Anti-Tampering Files Provided by State, Local, and Tribal Agencies

State FIPS	County FIPS	State Abbreviation	ATP File Name	Provided Updates for 2005
2	20	AK	atp02020.txt	
2	90	AK	atp02090.txt	
13	4	AZ	0401305.atp	✓
19	4	AZ	atp04019.txt	
6	1	CA	atp06001.txt	
6	7	CA	atp06007.txt	
6	11	CA	atp06007.txt	
6	13	CA	atp06001.txt	
6	17	CA	atp06007.txt	
6	19	CA	atp06007.txt	
6	21	CA	atp06007.txt	
6	29	CA	atp06007.txt	
6	31	CA	atp06007.txt	
6	37	CA	atp06007.txt	
6	39	CA	atp06007.txt	
6	41	CA	atp06001.txt	
6	47	CA	atp06007.txt	
6	53	CA	atp06007.txt	
6	55	CA	atp06001.txt	
6	57	CA	atp06007.txt	
6	59	CA	atp06007.txt	
6	61	CA	atp06007.txt	
6	65	CA	atp06007.txt	
6	67	CA	atp06007.txt	
6	69	CA	atp06007.txt	
6	71	CA	atp06007.txt	
6	73	CA	atp06007.txt	
6	75	CA	atp06001.txt	
6	77	CA	atp06007.txt	
6	79	CA	atp06007.txt	
6	81	CA	atp06001.txt	
6	83	CA	atp06007.txt	
6	85	CA	atp06007.txt	
6	87	CA	atp06007.txt	
6	89	CA	atp06007.txt	
6	95	CA	atp06001.txt	
6	97	CA	atp06007.txt	
6	99	CA	atp06007.txt	
6	101	CA	atp06007.txt	
6	103	CA	atp06007.txt	
6	107	CA	atp06007.txt	
6	111	CA	atp06007.txt	
6	113	CA	atp06007.txt	
6	115	CA	atp06007.txt	
8	1	CO	atp08001.txt	
8	5	CO	atp08001.txt	
8	13	CO	atp08001.txt	
8	14	CO	atp08001.txt	
8	31	CO	atp08001.txt	
8	35	CO	atp08001.txt	
8	41	CO	atp08001.txt	

Table A-2. Anti-Tampering Files Provided by State, Local, and Tribal Agencies

State FIPS	County FIPS	State Abbreviation	ATP File Name	Provided Updates for 2005
8	59	CO	atp08001.txt	
8	69	CO	atp08069.txt	
8	123	CO	atp08097.txt	
9	1	CT	atp09001.txt	
9	3	CT	atp09001.txt	
9	5	CT	atp09001.txt	
9	7	CT	atp09001.txt	
9	9	CT	atp09001.txt	
9	11	CT	atp09001.txt	
9	13	CT	atp09001.txt	
9	15	CT	atp09001.txt	
11	1	DC	1100105.atp	✓
13	67	GA	atp13067.txt	
13	89	GA	atp13067.txt	
13	121	GA	atp13067.txt	
13	135	GA	atp13067.txt	
16	1	ID	atp16001.txt	
18	19	IN	atp18019.txt	
18	43	IN	atp18019.txt	
18	89	IN	atp18089.txt	
18	127	IN	atp18089.txt	
21	15	KY	atp21015.txt	
21	37	KY	atp21015.txt	
21	117	KY	atp21015.txt	
21	111	KY	atp21015.txt	
22	5	LA	atp22005.txt	
22	19	LA	atp22005.txt	
22	33	LA	atp22005.txt	
22	47	LA	atp22005.txt	
22	63	LA	atp22005.txt	
22	77	LA	atp22005.txt	
22	121	LA	atp22005.txt	
23	1	ME	2300005.atp	✓
23	3	ME	2300005.atp	✓
23	5	ME	2300505.atp	✓
23	7	ME	2300005.atp	✓
23	9	ME	2300005.atp	✓
23	11	ME	2300005.atp	✓
23	13	ME	2300005.atp	✓
23	15	ME	2300005.atp	✓
23	17	ME	2300005.atp	✓
23	19	ME	2300005.atp	✓
23	21	ME	2300005.atp	✓
23	23	ME	2300005.atp	✓
23	25	ME	2300005.atp	✓
23	27	ME	2300005.atp	✓
23	29	ME	2300005.atp	✓
23	31	ME	2300005.atp	✓
24	3	MD	2400305.atp	✓
24	5	MD	2400305.atp	✓
24	9	MD	2400305.atp	✓

Table A-2. Anti-Tampering Files Provided by State, Local, and Tribal Agencies

State FIPS	County FIPS	State Abbreviation	ATP File Name	Provided Updates for 2005
24	13	MD	2400305.atp	✓
24	15	MD	2400305.atp	✓
24	17	MD	2400305.atp	✓
24	21	MD	2400305.atp	✓
24	25	MD	2400305.atp	✓
24	27	MD	2400305.atp	✓
24	31	MD	2400305.atp	✓
24	33	MD	2400305.atp	✓
24	35	MD	2400305.atp	✓
24	43	MD	2400305.atp	✓
24	510	MD	2400305.atp	✓
25	1	MA	atp25001.txt	
25	3	MA	atp25001.txt	
25	5	MA	atp25001.txt	
25	7	MA	atp25001.txt	
25	9	MA	atp25001.txt	
25	11	MA	atp25001.txt	
25	13	MA	atp25001.txt	
25	15	MA	atp25001.txt	
25	17	MA	atp25001.txt	
25	19	MA	atp25001.txt	
25	21	MA	atp25001.txt	
25	23	MA	atp25001.txt	
25	25	MA	atp25001.txt	
25	27	MA	atp25001.txt	
29	71	MO	atp29071.txt	
29	99	MO	atp29071.txt	
29	183	MO	atp29071.txt	
29	189	MO	atp29071.txt	
29	510	MO	atp29071.txt	
32	3	NV	atp32003.txt	
32	31	NV	atp32003.txt	
33	11	NH	atp33011.txt	
33	15	NH	atp33011.txt	
34	1	NJ	atp34001.txt	
34	3	NJ	atp34001.txt	
34	5	NJ	atp34001.txt	
34	7	NJ	atp34001.txt	
34	9	NJ	atp34001.txt	
34	11	NJ	atp34001.txt	
34	13	NJ	atp34001.txt	
34	15	NJ	atp34001.txt	
34	17	NJ	atp34001.txt	
34	19	NJ	atp34001.txt	
34	21	NJ	atp34001.txt	
34	23	NJ	atp34001.txt	
34	25	NJ	atp34001.txt	
34	27	NJ	atp34001.txt	
34	29	NJ	atp34001.txt	
34	31	NJ	atp34001.txt	
34	33	NJ	atp34001.txt	

Table A-2. Anti-Tampering Files Provided by State, Local, and Tribal Agencies

State FIPS	County FIPS	State Abbreviation	ATP File Name	Provided Updates for 2005
34	35	NJ	atp34001.txt	
34	37	NJ	atp34001.txt	
34	39	NJ	atp34001.txt	
34	41	NJ	atp34001.txt	
36	1	NY	3600102.atp	
36	3	NY	3600102.atp	
36	5	NY	atp36005.txt	
36	7	NY	3600102.atp	
36	9	NY	3600102.atp	
36	11	NY	3600102.atp	
36	13	NY	3600102.atp	
36	15	NY	3600102.atp	
36	17	NY	3600102.atp	
36	19	NY	3600102.atp	
36	21	NY	3600102.atp	
36	23	NY	3600102.atp	
36	25	NY	3600102.atp	
36	27	NY	3600102.atp	
36	29	NY	3600102.atp	
36	31	NY	3600102.atp	
36	33	NY	3600102.atp	
36	35	NY	3600102.atp	
36	37	NY	3600102.atp	
36	39	NY	3600102.atp	
36	41	NY	3600102.atp	
36	43	NY	3600102.atp	
36	45	NY	3600102.atp	
36	47	NY	atp36005.txt	
36	49	NY	3600102.atp	
36	53	NY	3600102.atp	
36	55	NY	3600102.atp	
36	57	NY	3600102.atp	
36	59	NY	atp36005.txt	
36	61	NY	atp36005.txt	
36	63	NY	3600102.atp	
36	65	NY	3600102.atp	
36	67	NY	3600102.atp	
36	69	NY	3600102.atp	
36	71	NY	3600102.atp	
36	73	NY	3600102.atp	
36	75	NY	3600102.atp	
36	77	NY	3600102.atp	
36	79	NY	3600102.atp	
36	81	NY	atp36005.txt	
36	83	NY	3600102.atp	
36	85	NY	atp36005.txt	
36	87	NY	atp36005.txt	
36	89	NY	3600102.atp	
36	91	NY	3600102.atp	
36	93	NY	3600102.atp	
36	95	NY	3600102.atp	

Table A-2. Anti-Tampering Files Provided by State, Local, and Tribal Agencies

State FIPS	County FIPS	State Abbreviation	ATP File Name	Provided Updates for 2005
36	97	NY	3600102.atp	
36	99	NY	3600102.atp	
36	101	NY	3600102.atp	
36	103	NY	atp36005.txt	
36	105	NY	3600102.atp	
36	107	NY	3600102.atp	
36	109	NY	3600102.atp	
36	111	NY	3600102.atp	
36	113	NY	3600102.atp	
36	115	NY	3600102.atp	
36	117	NY	3600102.atp	
36	119	NY	atp36005.txt	
36	121	NY	3600102.atp	
36	123	NY	3600102.atp	
37	57	NC	atp37057.txt	
37	59	NC	atp37057.txt	
37	63	NC	atp37057.txt	
37	67	NC	atp37057.txt	
37	71	NC	atp37071.txt	
37	77	NC	atp37071.txt	
37	81	NC	atp37057.txt	
37	119	NC	atp37119.txt	
37	183	NC	atp37183.txt	
39	17	OH	atp39017.txt	
39	23	OH	atp39017.txt	
39	25	OH	atp39025.txt	
39	35	OH	atp39035.txt	
39	55	OH	atp39035.txt	
39	57	OH	atp39017.txt	
39	61	OH	atp39017.txt	
39	85	OH	atp39035.txt	
39	93	OH	atp39035.txt	
39	103	OH	atp39103.txt	
39	113	OH	atp39017.txt	
39	133	OH	atp39035.txt	
39	153	OH	atp39035.txt	
39	165	OH	atp39017.txt	
40	17	OK	atp40017.txt	
40	27	OK	atp40017.txt	
40	37	OK	atp40017.txt	
40	73	OK	atp40017.txt	
40	81	OK	atp40017.txt	
40	83	OK	atp40017.txt	
40	87	OK	atp40017.txt	
40	109	OK	atp40017.txt	
40	113	OK	atp40017.txt	
40	125	OK	atp40017.txt	
40	131	OK	atp40017.txt	
40	143	OK	atp40017.txt	
40	145	OK	atp40017.txt	
41	5	OR	atp41005.txt	

Table A-2. Anti-Tampering Files Provided by State, Local, and Tribal Agencies

State FIPS	County FIPS	State Abbreviation	ATP File Name	Provided Updates for 2005
41	29	OR	atp41029.txt	
41	67	OR	atp41005.txt	
42	3	PA	atp42003.txt	
42	7	PA	atp42007.txt	
42	17	PA	atp42017.txt	
42	29	PA	atp42017.txt	
42	45	PA	atp42017.txt	
42	73	PA	atp42073.txt	
42	91	PA	atp42017.txt	
42	101	PA	atp42017.txt	
42	125	PA	atp42007.txt	
42	129	PA	atp42007.txt	
47	37	TN	atp47037.txt	
47	149	TN	atp47149.txt	
47	165	TN	atp47149.txt	
47	187	TN	atp47149.txt	
47	189	TN	atp47149.txt	
48	85	TX	4808502.atp	
48	113	TX	atp48113.txt	
48	121	TX	4808502.atp	
48	141	TX	atp48141.txt	
48	201	TX	atp48113.txt	
48	439	TX	atp48113.txt	
49	11	UT	4901105.atp	✓
49	35	UT	4903505.atp	✓
49	49	UT	4904905.atp	✓
49	57	UT	4905705.atp	✓
51	13	VA	5101305.atp	✓
51	59	VA	5101305.atp	✓
51	107	VA	5110705.atp	✓
51	153	VA	5101305.atp	✓
51	179	VA	5110705.atp	✓
51	510	VA	5101305.atp	✓
51	600	VA	5101305.atp	✓
51	610	VA	5101305.atp	✓
51	683	VA	5101305.atp	✓
51	685	VA	5101305.atp	✓

Table A-3. Counties With Stage II Control Programs 2005

FIPS State Code	State Name	FIPS County Code	County Name	Effect.%
6	CALIFORNIA	1	Alameda County	95
6	CALIFORNIA	3	Alpine County	95
6	CALIFORNIA	7	Butte County	95
6	CALIFORNIA	13	Contra Costa County	95
6	CALIFORNIA	17	El Dorado County	95
6	CALIFORNIA	19	Fresno County	95
6	CALIFORNIA	21	Glenn County	95
6	CALIFORNIA	25	Imperial County	95
6	CALIFORNIA	27	Inyo County	95
6	CALIFORNIA	29	Kern County	95
6	CALIFORNIA	31	Kings County	95
6	CALIFORNIA	37	Los Angeles County	95
6	CALIFORNIA	39	Madera County	95
6	CALIFORNIA	41	Marin County	95
6	CALIFORNIA	47	Merced County	95
6	CALIFORNIA	51	Mono County	95
6	CALIFORNIA	53	Monterey County	95
6	CALIFORNIA	55	Napa County	95
6	CALIFORNIA	57	Nevada County	95
6	CALIFORNIA	59	Orange County	95
6	CALIFORNIA	61	Placer County	95
6	CALIFORNIA	63	Plumas County	95
6	CALIFORNIA	65	Riverside County	95
6	CALIFORNIA	67	Sacramento County	95
6	CALIFORNIA	69	San Benito County	95
6	CALIFORNIA	71	San Bernardino County	95
6	CALIFORNIA	73	San Diego County	95
6	CALIFORNIA	75	San Francisco County	95
6	CALIFORNIA	77	San Joaquin County	95
6	CALIFORNIA	79	San Luis Obispo County	95
6	CALIFORNIA	81	San Mateo County	95
6	CALIFORNIA	83	Santa Barbara County	95
6	CALIFORNIA	85	Santa Clara County	95
6	CALIFORNIA	87	Santa Cruz County	95
6	CALIFORNIA	89	Shasta County	95
6	CALIFORNIA	91	Sierra County	95
6	CALIFORNIA	95	Solano County	95
6	CALIFORNIA	97	Sonoma County	95
6	CALIFORNIA	99	Stanislaus County	95
6	CALIFORNIA	101	Sutter County	95
6	CALIFORNIA	107	Tulare County	95
6	CALIFORNIA	109	Tuolumne County	95
6	CALIFORNIA	111	Ventura County	95
6	CALIFORNIA	113	Yolo County	95
6	CALIFORNIA	115	Yuba County	95
9	CONNECTICUT	1	Fairfield County	95
9	CONNECTICUT	3	Hartford County	95
9	CONNECTICUT	5	Litchfield County	95
9	CONNECTICUT	7	Middlesex County	95
9	CONNECTICUT	9	New Haven County	95
9	CONNECTICUT	11	New London County	95
9	CONNECTICUT	13	Tolland County	95

Table A-3. Counties With Stage II Control Programs 2005

FIPS State Code	State Name	FIPS County Code	County Name	Effect.%
9	CONNECTICUT	15	Windham County	95
10	DELAWARE	1	Kent County	86
10	DELAWARE	3	New Castle County	86
10	DELAWARE	5	Sussex County	86
11	DISTRICT OF COLUMBIA	1	District of Columbia	86
12	FLORIDA	11	Broward County	95
12	FLORIDA	86	Miami-Dade County	95
12	FLORIDA	99	Palm Beach County	95
13	GEORGIA	57	Cherokee County	86
13	GEORGIA	63	Clayton County	86
13	GEORGIA	67	Cobb County	86
13	GEORGIA	77	Coweta County	86
13	GEORGIA	89	DeKalb County	86
13	GEORGIA	97	Douglas County	86
13	GEORGIA	113	Fayette County	86
13	GEORGIA	117	Forsyth County	86
13	GEORGIA	121	Fulton County	86
13	GEORGIA	135	Gwinnett County	86
13	GEORGIA	151	Henry County	86
13	GEORGIA	223	Paulding County	86
13	GEORGIA	247	Rockdale County	86
17	ILLINOIS	31	Cook County	86
17	ILLINOIS	43	DuPage County	86
17	ILLINOIS	63	Grundy County	86
17	ILLINOIS	89	Kane County	86
17	ILLINOIS	93	Kendall County	86
17	ILLINOIS	97	Lake County	86
17	ILLINOIS	111	McHenry County	86
17	ILLINOIS	197	Will County	86
18	INDIANA	19	Clark County	86
18	INDIANA	43	Floyd County	86
18	INDIANA	89	Lake County	86
18	INDIANA	127	Porter County	86
21	KENTUCKY	15	Boone County	95
21	KENTUCKY	19	Boyd County	95
21	KENTUCKY	29	Bullitt County	95
21	KENTUCKY	37	Campbell County	95
21	KENTUCKY	89	Greenup County	95
21	KENTUCKY	111	Jefferson County	95
21	KENTUCKY	117	Kenton County	95
21	KENTUCKY	185	Oldham County	95
22	LOUISIANA	5	Ascension Parish	95
22	LOUISIANA	33	East Baton Rouge Parish	95
22	LOUISIANA	47	Iberville Parish	95
22	LOUISIANA	63	Livingston Parish	95
22	LOUISIANA	77	Pointe Coupee Parish	95
22	LOUISIANA	121	West Baton Rouge Parish	95
23	MAINE	5	Cumberland County	45*
23	MAINE	23	Sagadahoc County	41*
23	MAINE	31	York County	35*
24	MARYLAND	3	Anne Arundel County	95
24	MARYLAND	5	Baltimore County	95

Table A-3. Counties With Stage II Control Programs 2005

FIPS State Code	State Name	FIPS County Code	County Name	Effect.%
24	MARYLAND	9	Calvert County	95
24	MARYLAND	13	Carroll County	95
24	MARYLAND	15	Cecil County	95
24	MARYLAND	17	Charles County	95
24	MARYLAND	21	Frederick County	95
24	MARYLAND	25	Harford County	95
24	MARYLAND	27	Howard County	95
24	MARYLAND	31	Montgomery County	95
24	MARYLAND	33	Prince George's County	95
24	MARYLAND	510	Baltimore city	95
25	MASSACHUSETTS	1	Barnstable County	86
25	MASSACHUSETTS	3	Berkshire County	86
25	MASSACHUSETTS	5	Bristol County	86
25	MASSACHUSETTS	7	Dukes County	86
25	MASSACHUSETTS	9	Essex County	86
25	MASSACHUSETTS	11	Franklin County	86
25	MASSACHUSETTS	13	Hampden County	86
25	MASSACHUSETTS	15	Hampshire County	86
25	MASSACHUSETTS	17	Middlesex County	86
25	MASSACHUSETTS	19	Nantucket County	86
25	MASSACHUSETTS	21	Norfolk County	86
25	MASSACHUSETTS	23	Plymouth County	86
25	MASSACHUSETTS	25	Suffolk County	86
25	MASSACHUSETTS	27	Worcester County	86
29	MISSOURI	71	Franklin County	95
29	MISSOURI	99	Jefferson County	95
29	MISSOURI	183	St. Charles County	95
29	MISSOURI	189	St. Louis County	95
29	MISSOURI	510	St. Louis city	95
32	NEVADA	3	Clark County	95
32	NEVADA	31	Washoe County	95
33	NEW HAMPSHIRE	11	Hillsborough County	86
33	NEW HAMPSHIRE	13	Merrimack County	86
33	NEW HAMPSHIRE	15	Rockingham County	86
33	NEW HAMPSHIRE	17	Strafford County	86
34	NEW JERSEY	1	Atlantic County	62
34	NEW JERSEY	3	Bergen County	62
34	NEW JERSEY	5	Burlington County	62
34	NEW JERSEY	7	Camden County	62
34	NEW JERSEY	9	Cape May County	62
34	NEW JERSEY	11	Cumberland County	62
34	NEW JERSEY	13	Essex County	62
34	NEW JERSEY	15	Gloucester County	62
34	NEW JERSEY	17	Hudson County	62
34	NEW JERSEY	19	Hunterdon County	62
34	NEW JERSEY	21	Mercer County	62
34	NEW JERSEY	23	Middlesex County	62
34	NEW JERSEY	25	Monmouth County	62
34	NEW JERSEY	27	Morris County	62
34	NEW JERSEY	29	Ocean County	62
34	NEW JERSEY	31	Passaic County	62
34	NEW JERSEY	33	Salem County	62

Table A-3. Counties With Stage II Control Programs 2005

FIPS State Code	State Name	FIPS County Code	County Name	Effect.%
34	NEW JERSEY	35	Somerset County	62
34	NEW JERSEY	37	Sussex County	62
34	NEW JERSEY	39	Union County	62
34	NEW JERSEY	41	Warren County	62
36	NEW YORK	5	Bronx County	90
36	NEW YORK	47	Kings County	90
36	NEW YORK	59	Nassau County	90
36	NEW YORK	61	New York County	90
36	NEW YORK	71	Orange County	90
36	NEW YORK	81	Queens County	90
36	NEW YORK	85	Richmond County	90
36	NEW YORK	87	Rockland County	90
36	NEW YORK	103	Suffolk County	90
36	NEW YORK	119	Westchester County	90
39	OHIO	7	Ashtabula County	77
39	OHIO	17	Butler County	77
39	OHIO	23	Clark County	77
39	OHIO	25	Clermont County	77
39	OHIO	35	Cuyahoga County	77
39	OHIO	55	Geauga County	77
39	OHIO	57	Greene County	77
39	OHIO	61	Hamilton County	77
39	OHIO	85	Lake County	77
39	OHIO	93	Lorain County	77
39	OHIO	103	Medina County	77
39	OHIO	109	Miami County	77
39	OHIO	113	Montgomery County	77
39	OHIO	133	Portage County	77
39	OHIO	153	Summit County	77
39	OHIO	165	Warren County	77
41	OREGON	5	Clackamus County	86
41	OREGON	51	Multnomah County	86
41	OREGON	67	Washington County	86
42	PENNSYLVANIA	3	Allegheny County	95
42	PENNSYLVANIA	5	Armstrong County	95
42	PENNSYLVANIA	7	Beaver County	95
42	PENNSYLVANIA	11	Berks County	95
42	PENNSYLVANIA	17	Bucks County	95
42	PENNSYLVANIA	19	Butler County	95
42	PENNSYLVANIA	29	Chester County	95
42	PENNSYLVANIA	45	Delaware County	95
42	PENNSYLVANIA	51	Fayette County	95
42	PENNSYLVANIA	91	Montgomery County	95
42	PENNSYLVANIA	101	Philadelphia County	95
42	PENNSYLVANIA	125	Washington County	95
42	PENNSYLVANIA	129	Westmoreland County	95
44	RHODE ISLAND	1	Bristol County	86
44	RHODE ISLAND	3	Kent County	86
44	RHODE ISLAND	5	Newport County	86
44	RHODE ISLAND	7	Providence County	86
44	RHODE ISLAND	9	Washington County	86
47	TENNESSEE	37	Davidson County	86

Table A-3. Counties With Stage II Control Programs 2005

FIPS State Code	State Name	FIPS County Code	County Name	Effect.%
47	TENNESSEE	149	Rutherford County	86
47	TENNESSEE	165	Sumner County	86
47	TENNESSEE	187	Williamson County	86
47	TENNESSEE	189	Wilson County	86
48	TEXAS	39	Brazoria County	95
48	TEXAS	71	Chambers County	95
48	TEXAS	85	Collin County	95
48	TEXAS	113	Dallas County	95
48	TEXAS	121	Denton County	95
48	TEXAS	141	El Paso County	95
48	TEXAS	157	Fort Bend County	95
48	TEXAS	167	Galveston County	95
48	TEXAS	199	Hardin County	95
48	TEXAS	201	Harris County	95
48	TEXAS	245	Jefferson County	95
48	TEXAS	291	Liberty County	95
48	TEXAS	339	Montgomery County	95
48	TEXAS	361	Orange County	95
48	TEXAS	439	Tarrant County	95
48	TEXAS	473	Waller County	95
50	VERMONT	1	Addison County	86
50	VERMONT	3	Bennington County	86
50	VERMONT	5	Caledonia County	86
50	VERMONT	7	Chittenden County	86
50	VERMONT	9	Essex County	86
50	VERMONT	11	Franklin County	86
50	VERMONT	13	Grand Isle County	86
50	VERMONT	15	Lamoille County	86
50	VERMONT	17	Orange County	86
50	VERMONT	19	Orleans County	86
50	VERMONT	21	Rutland County	86
50	VERMONT	23	Washington County	86
50	VERMONT	25	Windham County	86
50	VERMONT	27	Windsor County	86
51	VIRGINIA	13	Arlington County	95
51	VIRGINIA	36	Charles City County	95
51	VIRGINIA	41	Chesterfield County	95
51	VIRGINIA	59	Fairfax County	95
51	VIRGINIA	85	Hanover County	95
51	VIRGINIA	87	Henrico County	95
51	VIRGINIA	107	Loudoun County	95
51	VIRGINIA	153	Prince William County	95
51	VIRGINIA	179	Stafford County	95
51	VIRGINIA	510	Alexandria city	95
51	VIRGINIA	570	Colonial Heights city	95
51	VIRGINIA	600	Fairfax city	95
51	VIRGINIA	610	Falls Church city	95
51	VIRGINIA	670	Hopewell city	95
51	VIRGINIA	683	Manassas city	95
51	VIRGINIA	685	Manassas Park city	95
51	VIRGINIA	760	Richmond city	95
53	WASHINGTON	11	Clark County	86

Table A-3. Counties With Stage II Control Programs 2005

FIPS State Code	State Name	FIPS County Code	County Name	Effect.%
53	WASHINGTON	15	Cowlitz County	86
53	WASHINGTON	33	King County	86
53	WASHINGTON	35	Kitsap County	86
53	WASHINGTON	53	Pierce County	86
53	WASHINGTON	61	Snohomish County	86
55	WISCONSIN	59	Kenosha County	86
55	WISCONSIN	61	Kewaunee County	86
55	WISCONSIN	71	Manitowoc County	86
55	WISCONSIN	79	Milwaukee County	86
55	WISCONSIN	89	Ozaukee County	86
55	WISCONSIN	101	Racine County	86
55	WISCONSIN	117	Sheboygan County	86
55	WISCONSIN	131	Washington County	86
55	WISCONSIN	133	Waukesha County	86

*NOTE: For the 2005 NEI, Maine provided listed values for LDV Stage 2; control effectiveness values of 4, 3, and 3% were submitted for HDV Stage 2 for Cumberland, Sagadahoc, and York counties, respectively

Table A-4. Registration Distributions Provided by State, Local, and Tribal Agencies

State FIPS	State Abbreviation	Registration Distribution File Name	Provided Updates for 2005
1	AL	Default	
2	AK	Default	
4	AZ	401305	✓
4	AZ	401902	
4	AZ	Default	
5	AR	Default	
6	CA	Default	
8	CO	Default	
9	CT	Default	
10	DE	1000102	
10	DE	1000302	
10	DE	1000502	
11	DC	1100105	✓
12	FL	Default	
13	GA	Default	
15	HI	Default	
16	ID	Default	
17	IL	1703102	
17	IL	1711902	
17	IL	Default	
18	IN	Default	
19	IA	1900102	
19	IA	1900302	
19	IA	1900502	
19	IA	1900702	
19	IA	1900902	
19	IA	1901102	
19	IA	1901302	
19	IA	1901502	
19	IA	1901702	
19	IA	1901902	
19	IA	1902102	
19	IA	1902302	
19	IA	1902502	
19	IA	1902702	
19	IA	1902902	
19	IA	1903102	
19	IA	1903302	
19	IA	1903502	
19	IA	1903702	
19	IA	1903902	
19	IA	1904102	
19	IA	1904302	
19	IA	1904502	
19	IA	1904702	
19	IA	1904902	
19	IA	1905102	
19	IA	1905302	
19	IA	1905502	
19	IA	1905702	
19	IA	1905902	

Table A-4. Registration Distributions Provided by State, Local, and Tribal Agencies

State FIPS	State Abbreviation	Registration Distribution File Name	Provided Updates for 2005
19	IA	1906102	
19	IA	1906302	
19	IA	1906502	
19	IA	1906702	
19	IA	1906902	
19	IA	1907102	
19	IA	1907302	
19	IA	1907502	
19	IA	1907702	
19	IA	1907902	
19	IA	1908102	
19	IA	1908302	
19	IA	1908502	
19	IA	1908702	
19	IA	1908902	
19	IA	1909102	
19	IA	1909302	
19	IA	1909502	
19	IA	1909702	
19	IA	1909902	
19	IA	1910102	
19	IA	1910302	
19	IA	1910502	
19	IA	1910702	
19	IA	1910902	
19	IA	1911102	
19	IA	1911302	
19	IA	1911502	
19	IA	1911702	
19	IA	1911902	
19	IA	1912102	
19	IA	1912302	
19	IA	1912502	
19	IA	1912702	
19	IA	1912902	
19	IA	1913102	
19	IA	1913302	
19	IA	1913502	
19	IA	1913702	
19	IA	1913902	
19	IA	1914102	
19	IA	1914302	
19	IA	1914502	
19	IA	1914702	
19	IA	1914902	
19	IA	1915102	
19	IA	1915302	
19	IA	1915502	
19	IA	1915702	
19	IA	1915902	
19	IA	1916102	
19	IA	1916302	

Table A-4. Registration Distributions Provided by State, Local, and Tribal Agencies

State FIPS	State Abbreviation	Registration Distribution File Name	Provided Updates for 2005
19	IA	1916502	
19	IA	1916702	
19	IA	1916902	
19	IA	1917102	
19	IA	1917302	
19	IA	1917502	
19	IA	1917702	
19	IA	1917902	
19	IA	1918102	
19	IA	1918302	
19	IA	1918502	
19	IA	1918702	
19	IA	1918902	
19	IA	1919102	
19	IA	1919302	
19	IA	1919502	
19	IA	1919702	
20	KS	Default	
21	KY	2111102	
21	KY	Default	
22	LA	Default	
23	ME	Default	
24	MD	2400105	✓
24	MD	2400305	✓
24	MD	2401505	✓
24	MD	2402905	✓
24	MD	2403505	✓
24	MD	2404305	✓
25	MA	2500002	
26	MI	Default	
27	MN	2700102	
27	MN	2700302	
27	MN	2700502	
27	MN	2700702	
27	MN	2700902	
27	MN	2701102	
27	MN	2701302	
27	MN	2701502	
27	MN	2701702	
27	MN	2701902	
27	MN	2702102	
27	MN	2702302	
27	MN	2702502	
27	MN	2702702	
27	MN	2702902	
27	MN	2703102	
27	MN	2703302	
27	MN	2703502	
27	MN	2703702	
27	MN	2703902	
27	MN	2704102	
27	MN	2704302	

Table A-4. Registration Distributions Provided by State, Local, and Tribal Agencies

State FIPS	State Abbreviation	Registration Distribution File Name	Provided Updates for 2005
27	MN	2704502	
27	MN	2704702	
27	MN	2704902	
27	MN	2705102	
27	MN	2705302	
27	MN	2705502	
27	MN	2705702	
27	MN	2705902	
27	MN	2706102	
27	MN	2706302	
27	MN	2706502	
27	MN	2706702	
27	MN	2706902	
27	MN	2707102	
27	MN	2707302	
27	MN	2707502	
27	MN	2707702	
27	MN	2707902	
27	MN	2708102	
27	MN	2708302	
27	MN	2708502	
27	MN	2708702	
27	MN	2708902	
27	MN	2709102	
27	MN	2709302	
27	MN	2709502	
27	MN	2709702	
27	MN	2709902	
27	MN	2710102	
27	MN	2710302	
27	MN	2710502	
27	MN	2710702	
27	MN	2710902	
27	MN	2711102	
27	MN	2711302	
27	MN	2711502	
27	MN	2711702	
27	MN	2711902	
27	MN	2712102	
27	MN	2712302	
27	MN	2712502	
27	MN	2712702	
27	MN	2712902	
27	MN	2713102	
27	MN	2713302	
27	MN	2713502	
27	MN	2713702	
27	MN	2713902	
27	MN	2714102	
27	MN	2714302	
27	MN	2714502	
27	MN	2714702	

Table A-4. Registration Distributions Provided by State, Local, and Tribal Agencies

State FIPS	State Abbreviation	Registration Distribution File Name	Provided Updates for 2005
27	MN	2714902	
27	MN	2715102	
27	MN	2715302	
27	MN	2715502	
27	MN	2715702	
27	MN	2715902	
27	MN	2716102	
27	MN	2716302	
27	MN	2716502	
27	MN	2716702	
27	MN	2716902	
27	MN	2717102	
27	MN	2717302	
28	MS	Default	
29	MO	Default	
30	MT	Default	
31	NE	Default	
32	NV	Default	
33	NH	Default	
34	NJ	3400102	
35	NM	Default	
36	NY	3600102	
36	NY	3600502	
37	NC	Default	
38	ND	Default	
39	OH	3900102	
39	OH	3900302	
39	OH	3900502	
39	OH	3900702	
39	OH	3900902	
39	OH	3901102	
39	OH	3901302	
39	OH	3901502	
39	OH	3901702	
39	OH	3901902	
39	OH	3902102	
39	OH	3902302	
39	OH	3902502	
39	OH	3902702	
39	OH	3902902	
39	OH	3903102	
39	OH	3903302	
39	OH	3903502	
39	OH	3903702	
39	OH	3903902	
39	OH	3904102	
39	OH	3904302	
39	OH	3904502	
39	OH	3904702	
39	OH	3904902	
39	OH	3905102	
39	OH	3905302	

Table A-4. Registration Distributions Provided by State, Local, and Tribal Agencies

State FIPS	State Abbreviation	Registration Distribution File Name	Provided Updates for 2005
39	OH	3905502	
39	OH	3905702	
39	OH	3905902	
39	OH	3906102	
39	OH	3906302	
39	OH	3906502	
39	OH	3906702	
39	OH	3906902	
39	OH	3907102	
39	OH	3907302	
39	OH	3907502	
39	OH	3907702	
39	OH	3907902	
39	OH	3908102	
39	OH	3908302	
39	OH	3908502	
39	OH	3908702	
39	OH	3908902	
39	OH	3909102	
39	OH	3909302	
39	OH	3909502	
39	OH	3909702	
39	OH	3909902	
39	OH	3910102	
39	OH	3910302	
39	OH	3910502	
39	OH	3910702	
39	OH	3910902	
39	OH	3911102	
39	OH	3911302	
39	OH	3911502	
39	OH	3911702	
39	OH	3911902	
39	OH	3912102	
39	OH	3912302	
39	OH	3912502	
39	OH	3912702	
39	OH	3912902	
39	OH	3913102	
39	OH	3913302	
39	OH	3913502	
39	OH	3913702	
39	OH	3913902	
39	OH	3914102	
39	OH	3914302	
39	OH	3914502	
39	OH	3914702	
39	OH	3914902	
39	OH	3915102	
39	OH	3915302	
39	OH	3915502	
39	OH	3915702	

Table A-4. Registration Distributions Provided by State, Local, and Tribal Agencies

State FIPS	State Abbreviation	Registration Distribution File Name	Provided Updates for 2005
39	OH	3915902	
39	OH	3916102	
39	OH	3916302	
39	OH	3916502	
39	OH	3916702	
39	OH	3916902	
39	OH	3917102	
39	OH	3917302	
39	OH	3917502	
40	OK	Default	
41	OR	4100102	
41	OR	4100302	
41	OR	4100502	
41	OR	4100702	
41	OR	4100902	
41	OR	4101102	
41	OR	4101302	
41	OR	4101502	
41	OR	4101702	
41	OR	4101902	
41	OR	4102102	
41	OR	4102302	
41	OR	4102502	
41	OR	4102702	
41	OR	4102902	
41	OR	4103102	
41	OR	4103302	
41	OR	4103502	
41	OR	4103702	
41	OR	4103902	
41	OR	4104102	
41	OR	4104302	
41	OR	4104502	
41	OR	4104702	
41	OR	4104902	
41	OR	4105102	
41	OR	4105302	
41	OR	4105502	
41	OR	4105702	
41	OR	4105902	
41	OR	4106102	
41	OR	4106302	
41	OR	4106502	
41	OR	4106702	
41	OR	4106902	
41	OR	4107102	
42	PA	Default	
44	RI	4400002	
45	SC	Default	
46	SD	Default	
47	TN	4700302	
47	TN	4703702	

Table A-4. Registration Distributions Provided by State, Local, and Tribal Agencies

State FIPS	State Abbreviation	Registration Distribution File Name	Provided Updates for 2005
47	TN	4706502	
47	TN	4709302	
47	TN	4715702	
47	TN	4716302	
47	TN	Default	
48	TX	4800102	
48	TX	4800302	
48	TX	4800502	
48	TX	4800702	
48	TX	4800902	
48	TX	4801102	
48	TX	4801302	
48	TX	4801502	
48	TX	4801702	
48	TX	4802102	
48	TX	4802702	
48	TX	4802902	
48	TX	4803102	
48	TX	4803302	
48	TX	4803702	
48	TX	4803902	
48	TX	4804102	
48	TX	4804302	
48	TX	4804502	
48	TX	4804702	
48	TX	4804902	
48	TX	4805502	
48	TX	4807102	
48	TX	4808102	
48	TX	4808502	
48	TX	4809102	
48	TX	4811302	
48	TX	4811902	
48	TX	4812102	
48	TX	4812702	
48	TX	4813902	
48	TX	4814102	
48	TX	4814302	
48	TX	4815702	
48	TX	4816702	
48	TX	4818302	
48	TX	4818702	
48	TX	4819902	
48	TX	4820102	
48	TX	4820302	
48	TX	4820902	
48	TX	4821302	
48	TX	4822102	
48	TX	4823102	
48	TX	4824102	
48	TX	4824502	
48	TX	4825102	

Table A-4. Registration Distributions Provided by State, Local, and Tribal Agencies

State FIPS	State Abbreviation	Registration Distribution File Name	Provided Updates for 2005
48	TX	4825702	
48	TX	4829102	
48	TX	4833902	
48	TX	4836102	
48	TX	4836702	
48	TX	4839702	
48	TX	4840102	
48	TX	4842302	
48	TX	4843902	
48	TX	4845302	
48	TX	4845902	
48	TX	4847302	
48	TX	4849102	
48	TX	4849302	
49	UT	4900105	✓
49	UT	4900305	✓
49	UT	4900505	✓
49	UT	4900705	✓
49	UT	4900905	✓
49	UT	4901105	✓
49	UT	4901305	✓
49	UT	4901505	✓
49	UT	4901705	✓
49	UT	4901905	✓
49	UT	4902105	✓
49	UT	4902305	✓
49	UT	4902505	✓
49	UT	4902705	✓
49	UT	4902905	✓
49	UT	4903105	✓
49	UT	4903305	✓
49	UT	4903505	✓
49	UT	4903705	✓
49	UT	4903905	✓
49	UT	4904105	✓
49	UT	4904305	✓
49	UT	4904505	✓
49	UT	4904705	✓
49	UT	4904905	✓
49	UT	4905105	✓
49	UT	4905305	✓
49	UT	4905505	✓
49	UT	4905705	✓
50	VT	5000002	
51	VA	5101305	✓
51	VA	5102305	✓
51	VA	5103605	✓
51	VA	5104105	✓
51	VA	5105905	✓
51	VA	5106905	✓
51	VA	5107305	✓
51	VA	5108505	✓

Table A-4. Registration Distributions Provided by State, Local, and Tribal Agencies

State FIPS	State Abbreviation	Registration Distribution File Name	Provided Updates for 2005
51	VA	5108705	✓
51	VA	5109305	✓
51	VA	5109505	✓
51	VA	5110705	✓
51	VA	5111305	✓
51	VA	5113905	✓
51	VA	5114905	✓
51	VA	5115305	✓
51	VA	5116105	✓
51	VA	5117705	✓
51	VA	5117905	✓
51	VA	5119905	✓
51	VA	5151005	✓
51	VA	5155005	✓
51	VA	5157005	✓
51	VA	5160005	✓
51	VA	5161005	✓
51	VA	5163005	✓
51	VA	5165005	✓
51	VA	5167005	✓
51	VA	5168305	✓
51	VA	5168505	✓
51	VA	5170005	✓
51	VA	5171005	✓
51	VA	5173005	✓
51	VA	5173505	✓
51	VA	5174005	✓
51	VA	5176005	✓
51	VA	5177005	✓
51	VA	5177505	✓
51	VA	5180005	✓
51	VA	5181005	✓
51	VA	5183005	✓
51	VA	5184005	✓
51	VA	Default	✓
53	WA	5300002	
54	WV	Default	
55	WI	5500002	
56	WY	Default	
72	PR	Default	
78	VI	Default	

All external file names use the file name extension REG. All file names have the form aabbbcc.reg, where aa is the FIPS State, bbb is the FIPS county and cc is the last two digits of the calendar year. Default means that the MOBILE6 default registration distributions were used.

Table A-5. 25-Year Trend of Vehicle Registrations And New Sales in Puerto Rico

Year	New Vehicle Sales	Total Vehicle Registrations
1973	138,108	681,596
1974	66,738	738,485
1975	73,388	773,742
1976	83,505	814,373
1977	110,393	830,373
1978	101,254	980,200
1979	103,859	1,035,200
1980	88,000	1,120,312
1981	98,193	1,201,774
1982	66,158	1,228,405
1983	60,987	1,259,111
1984	92,974	1,245,000
1985	116,431	1,353,670
1986	141,219	1,451,281
1987	118,048	1,560,308
1988	131,958	1,551,415
1989	148,459	1,567,319
1990	125,577	1,582,081
1991	116,386	1,516,102
1992	113,682	1,650,709
1993	141,550	1,740,371
1994	146,951	1,872,361
1995	160,394	2,014,207
1996	147,605	2,166,697
1997	180,027	2,272,643

Highway Statistics 2002. Federal Highway Administration, U.S. Department of Transportation, Washington, DC, 2002.

Table A-6. Diesel Sales Fractions Provided by State, Local, and Tribal Agencies

State FIPS	State Abbreviation	Diesel Sales Fraction File Name	Provided Updates for 2005
1	AL	Default	
2	AK	Default	
4	AZ	0401305	✓
4	AZ	Default	
5	AR	Default	
6	CA	Default	
8	CO	Default	
9	CT	Default	
10	DE	Default	
11	DC	1100105	✓
12	FL	Default	
13	GA	Default	
15	HI	Default	
16	ID	Default	
17	IL	Default	
18	IN	Default	
19	IA	1900005	
20	KS	Default	
21	KY	Default	
22	LA	Default	
23	ME	Default	
24	MD	2400105	✓
24	MD	2400305	✓
24	MD	2401505	✓
24	MD	2402905	✓
24	MD	2403505	✓
24	MD	2404305	✓
24	MD	Default	
25	MA	Default	
26	MI	Default	
27	MN	2700105	
27	MN	2700305	
27	MN	2700505	
27	MN	2700705	
27	MN	2700905	
27	MN	2701105	
27	MN	2701305	
27	MN	2701505	
27	MN	2701705	
27	MN	2701905	
27	MN	2702105	
27	MN	2702305	
27	MN	2702505	
27	MN	2702705	
27	MN	2702905	
27	MN	2703105	
27	MN	2703305	
27	MN	2703505	
27	MN	2703705	
27	MN	2703905	
27	MN	2704105	

Table A-6. Diesel Sales Fractions Provided by State, Local, and Tribal Agencies

State FIPS	State Abbreviation	Diesel Sales Fraction File Name	Provided Updates for 2005
27	MN	2704305	
27	MN	2704505	
27	MN	2704705	
27	MN	2704905	
27	MN	2705105	
27	MN	2705305	
27	MN	2705505	
27	MN	2705705	
27	MN	2705905	
27	MN	2706105	
27	MN	2706305	
27	MN	2706505	
27	MN	2706705	
27	MN	2706905	
27	MN	2707105	
27	MN	2707305	
27	MN	2707505	
27	MN	2707705	
27	MN	2707905	
27	MN	2708105	
27	MN	2708305	
27	MN	2708505	
27	MN	2708705	
27	MN	2708905	
27	MN	2709105	
27	MN	2709305	
27	MN	2709505	
27	MN	2709705	
27	MN	2709905	
27	MN	2710105	
27	MN	2710305	
27	MN	2710505	
27	MN	2710705	
27	MN	2710905	
27	MN	2711105	
27	MN	2711305	
27	MN	2711505	
27	MN	2711705	
27	MN	2711905	
27	MN	2712105	
27	MN	2712305	
27	MN	2712505	
27	MN	2712705	
27	MN	2712905	
27	MN	2713105	
27	MN	2713305	
27	MN	2713505	
27	MN	2713705	
27	MN	2713905	
27	MN	2714105	
27	MN	2714305	
27	MN	2714505	

Table A-6. Diesel Sales Fractions Provided by State, Local, and Tribal Agencies

State FIPS	State Abbreviation	Diesel Sales Fraction File Name	Provided Updates for 2005
27	MN	2714705	
27	MN	2714905	
27	MN	2715105	
27	MN	2715305	
27	MN	2715505	
27	MN	2715705	
27	MN	2715905	
27	MN	2716105	
27	MN	2716305	
27	MN	2716505	
27	MN	2716705	
27	MN	2716905	
27	MN	2717105	
27	MN	2717305	
28	MS	Default	
29	MO	Default	
30	MT	Default	
31	NE	Default	
32	NV	Default	
33	NH	Default	
34	NJ	3400105	
35	NM	Default	
36	NY	3600105	
36	NY	3600505	
37	NC	Default	
38	ND	Default	
39	OH	Default	
40	OK	Default	
41	OR	Default	
42	PA	Default	
44	RI	Default	
45	SC	Default	
46	SD	Default	
47	TN	Default	
48	TX	4800105	
48	TX	4802105	
48	TX	4802905	
48	TX	4803905	
48	TX	4808505	
48	TX	4811305	
48	TX	4813905	
48	TX	4814105	
48	TX	4818305	
48	TX	4819905	
49	UT	Default	
50	VT	Default	
51	VA	5101305	✓
51	VA	5105905	✓
51	VA	5110705	✓
51	VA	5115305	✓
51	VA	5117905	✓
51	VA	5151005	✓

Table A-6. Diesel Sales Fractions Provided by State, Local, and Tribal Agencies

State FIPS	State Abbreviation	Diesel Sales Fraction File Name	Provided Updates for 2005
51	VA	Default	
53	WA	Default	
54	WV	Default	
55	WI	Default	
56	WY	Default	
72	PR	Default	
78	VI	Default	

All external file names use the file name extension DSL. All file names have the form aabbbcc.dsl, where aa is the FIPS State, bbb is the FIPS county and cc is the last two digits of the calendar year. Default means that the MOBILE6 default diesel sales fractions were used.
NOTE: Diesel Sales Fraction Files for IA, MN, NJ, NY, and TX reported by EPA in NCD for 2005 NEI Version 1

Table A-7. Average Speeds by Road Type and Vehicle Type (mph)

	Rural Interstate	Rural Principal Arterial	Rural Minor Arterial	Rural Major Collector	Rural Minor Collector	Rural Local
LDV	60	45	40	35	30	30
LDT	55	45	40	35	30	30
HDV	40	35	30	25	25	25

	Urban Interstate	Urban Other Freeways & Expressways	Urban Principal Arterial	Urban Minor Arterial	Urban Collector	Urban Local
LDV	45	45	20	20	20	20
LDT	45	45	20	20	20	20
HDV	35	35	15	15	15	15

LDV : Passenger cars.
LDT : Trucks less than 8,500 lbs. Gross Vehicle Weight Rating (GVWR).
HDV : Trucks greater than 8,500 lbs. GVWR.

Table A-8. Average Speed Distributions Provided by State, Local, and Tribal Agencies

State FIPS	County FIPS	State Abbreviation	County Name	Average Speed Distribution Base File Name	Provided Updates for 2005
10	1	DE	Kent County	1000102	
10	3	DE	New Castle County	1000302	
10	5	DE	Sussex County	1000502	
11	1	DC	District of Columbia	1100105	✓
19	1	IA	Adair County	1900102	
19	3	IA	Adams County	1900302	
19	5	IA	Allamakee County	1900502	
19	7	IA	Appanoose County	1900702	
19	9	IA	Audubon County	1900902	
19	11	IA	Benton County	1901102	
19	13	IA	Black Hawk County	1901302	
19	15	IA	Boone County	1901502	
19	17	IA	Bremer County	1901702	
19	19	IA	Buchanan County	1901902	
19	21	IA	Buena Vista County	1902102	
19	23	IA	Butler County	1902302	
19	25	IA	Calhoun County	1902502	
19	27	IA	Carroll County	1902702	
19	29	IA	Cass County	1902902	
19	31	IA	Cedar County	1903102	
19	33	IA	Cerro Gordo County	1903302	
19	35	IA	Cherokee County	1903502	
19	37	IA	Chickasaw County	1903702	
19	39	IA	Clarke County	1903902	
19	41	IA	Clay County	1904102	
19	43	IA	Clayton County	1904302	
19	45	IA	Clinton County	1904502	
19	47	IA	Crawford County	1904702	
19	49	IA	Dallas County	1904902	
19	51	IA	Davis County	1905102	
19	53	IA	Decatur County	1905302	
19	55	IA	Delaware County	1905502	
19	57	IA	Des Moines County	1905702	
19	59	IA	Dickinson County	1905902	
19	61	IA	Dubuque County	1906102	
19	63	IA	Emmet County	1906302	
19	65	IA	Fayette County	1906502	
19	67	IA	Floyd County	1906702	
19	69	IA	Franklin County	1906902	
19	71	IA	Fremont County	1907102	
19	73	IA	Greene County	1907302	
19	75	IA	Grundy County	1907502	
19	77	IA	Guthrie County	1907702	
19	79	IA	Hamilton County	1907902	
19	81	IA	Hancock County	1908102	
19	83	IA	Hardin County	1908302	
19	85	IA	Harrison County	1908502	
19	87	IA	Henry County	1908702	
19	89	IA	Howard County	1908902	
19	91	IA	Humboldt County	1909102	
19	93	IA	Ida County	1909302	

Table A-8. Average Speed Distributions Provided by State, Local, and Tribal Agencies

State FIPS	County FIPS	State Abbreviation	County Name	Average Speed Distribution Base File Name	Provided Updates for 2005
19	95	IA	Iowa County	1909502	
19	97	IA	Jackson County	1909702	
19	99	IA	Jasper County	1909902	
19	101	IA	Jefferson County	1910102	
19	103	IA	Johnson County	1910302	
19	105	IA	Jones County	1910502	
19	107	IA	Keokuk County	1910702	
19	109	IA	Kossuth County	1910902	
19	111	IA	Lee County	1911102	
19	113	IA	Linn County	1911302	
19	115	IA	Louisa County	1911502	
19	117	IA	Lucas County	1911702	
19	119	IA	Lyon County	1911902	
19	121	IA	Madison County	1912102	
19	123	IA	Mahaska County	1912302	
19	125	IA	Marion County	1912502	
19	127	IA	Marshall County	1912702	
19	129	IA	Mills County	1912902	
19	131	IA	Mitchell County	1913102	
19	133	IA	Monona County	1913302	
19	135	IA	Monroe County	1913502	
19	137	IA	Montgomery County	1913702	
19	139	IA	Muscatine County	1913902	
19	141	IA	O'Brien County	1914102	
19	143	IA	Osceola County	1914302	
19	145	IA	Page County	1914502	
19	147	IA	Palo Alto County	1914702	
19	149	IA	Plymouth County	1914902	
19	151	IA	Pocahontas County	1915102	
19	153	IA	Polk County	1915302	
19	155	IA	Pottawattamie County	1915502	
19	157	IA	Poweshiek County	1915702	
19	159	IA	Ringgold County	1915902	
19	161	IA	Sac County	1916102	
19	163	IA	Scott County	1916302	
19	165	IA	Shelby County	1916502	
19	167	IA	Sioux County	1916702	
19	169	IA	Story County	1916902	
19	171	IA	Tama County	1917102	
19	173	IA	Taylor County	1917302	
19	175	IA	Union County	1917502	
19	177	IA	Van Buren County	1917702	
19	179	IA	Wapello County	1917902	
19	181	IA	Warren County	1918102	
19	183	IA	Washington County	1918302	
19	185	IA	Wayne County	1918502	
19	187	IA	Webster County	1918702	
19	189	IA	Winnebago County	1918902	
19	191	IA	Winneshiek County	1919102	
19	193	IA	Woodbury County	1919302	
19	195	IA	Worth County	1919502	

Table A-8. Average Speed Distributions Provided by State, Local, and Tribal Agencies

State FIPS	County FIPS	State Abbreviation	County Name	Average Speed Distribution Base File Name	Provided Updates for 2005
19	197	IA	Wright County	1919702	
24	1	MD	Allegany County	2400002	
24	3	MD	Anne Arundel County	2400002	
24	5	MD	Baltimore County	2400002	
24	9	MD	Calvert County	2400002	
24	11	MD	Caroline County	2400002	
24	13	MD	Carroll County	2400002	
24	15	MD	Cecil County	2400002	
24	17	MD	Charles County	2400002	
24	19	MD	Dorchester County	2400002	
24	21	MD	Frederick County	2400002	
24	23	MD	Garrett County	2400002	
24	25	MD	Harford County	2400002	
24	27	MD	Howard County	2400002	
24	29	MD	Kent County	2400002	
24	31	MD	Montgomery County	2400002	
24	33	MD	Prince George’s County	2400002	
24	35	MD	Queen Anne’s County	2400002	
24	37	MD	St. Mary’s County	2400002	
24	39	MD	Somerset County	2400002	
24	41	MD	Talbot County	2400002	
24	43	MD	Washington County	2400002	
24	45	MD	Wicomico County	2400002	
24	47	MD	Worcester County	2400002	
24	510	MD	Baltimore city	2400002	
34	1	NJ	Atlantic County	3400102	
34	3	NJ	Bergen County	3400302	
34	5	NJ	Burlington County	3400502	
34	7	NJ	Camden County	3400702	
34	9	NJ	Cape May County	3400902	
34	11	NJ	Cumberland County	3401102	
34	13	NJ	Essex County	3401302	
34	15	NJ	Gloucester County	3401502	
34	17	NJ	Hudson County	3401702	
34	19	NJ	Hunterdon County	3401902	
34	21	NJ	Mercer County	3402102	
34	23	NJ	Middlesex County	3402302	
34	25	NJ	Monmouth County	3402502	
34	27	NJ	Morris County	3402702	
34	29	NJ	Ocean County	3402902	
34	31	NJ	Passaic County	3403102	
34	33	NJ	Salem County	3403302	
34	35	NJ	Somerset County	3403502	
34	37	NJ	Sussex County	3403702	
34	39	NJ	Union County	3403902	
34	41	NJ	Warren County	3404102	
35	1	NM	Bernalillo County	3500102	
44	1	RI	Bristol County	4400002	
44	3	RI	Kent County	4400002	
44	5	RI	Newport County	4400002	
44	7	RI	Providence County	4400002	

Table A-8. Average Speed Distributions Provided by State, Local, and Tribal Agencies

State FIPS	County FIPS	State Abbreviation	County Name	Average Speed Distribution Base File Name	Provided Updates for 2005
44	9	RI	Washington County	4400002	
49	1	UT	Beaver County	4900005	✓
49	3	UT	Box Elder County	4900005	✓
49	5	UT	Cache County	4900005	✓
49	7	UT	Carbon County	4900005	✓
49	9	UT	Daggett County	4900005	✓
49	11	UT	Davis County	4901105	✓
49	13	UT	Duchesne County	4900005	✓
49	15	UT	Emery County	4900005	✓
49	17	UT	Garfield County	4900005	✓
49	19	UT	Grand County	4900005	✓
49	21	UT	Iron County	4900005	✓
49	23	UT	Juab County	4900005	✓
49	25	UT	Kane County	4900005	✓
49	27	UT	Millard County	4900005	✓
49	29	UT	Morgan County	4900005	✓
49	31	UT	Piute County	4900005	✓
49	33	UT	Rich County	4900005	✓
49	35	UT	Salt Lake County	4903505	✓
49	37	UT	San Juan County	4900005	✓
49	39	UT	Sanpete County	4900005	✓
49	41	UT	Sevier County	4900005	✓
49	43	UT	Summit County	4900005	✓
49	45	UT	Tooele County	4900005	✓
49	47	UT	Uintah County	4900005	✓
49	49	UT	Utah County	4904905	✓
49	51	UT	Wasatch County	4900005	✓
49	53	UT	Washington County	4900005	✓
49	55	UT	Wayne County	4900005	✓
49	57	UT	Weber County	4905705	✓
51	1	VA	Accomack County	5100102	
51	3	VA	Albemarle County	5100302	
51	5	VA	Alleghany County	5100502	
51	7	VA	Amelia County	5100702	
51	9	VA	Amherst County	5100902	
51	11	VA	Appomattox County	5101102	
51	13	VA	Arlington County	5101302	
51	15	VA	Augusta County	5101502	
51	17	VA	Bath County	5101702	
51	19	VA	Bedford County	5101902	
51	21	VA	Bland County	5102102	
51	23	VA	Botetourt County	5102302	
51	25	VA	Brunswick County	5102502	
51	27	VA	Buchanan County	5102702	
51	29	VA	Buckingham County	5102902	
51	31	VA	Campbell County	5103102	
51	33	VA	Caroline County	5103302	
51	35	VA	Carroll County	5103502	
51	36	VA	Charles City County	5103602	
51	37	VA	Charlotte County	5103702	
51	41	VA	Chesterfield County	5104102	

Table A-8. Average Speed Distributions Provided by State, Local, and Tribal Agencies

State FIPS	County FIPS	State Abbreviation	County Name	Average Speed Distribution Base File Name	Provided Updates for 2005
51	43	VA	Clarke County	5104302	
51	45	VA	Craig County	5104502	
51	47	VA	Culpeper County	5104702	
51	49	VA	Cumberland County	5104902	
51	51	VA	Dickenson County	5105102	
51	53	VA	Dinwiddie County	5105302	
51	57	VA	Essex County	5105702	
51	59	VA	Fairfax County	5105902	
51	61	VA	Fauquier County	5106102	
51	63	VA	Floyd County	5106302	
51	65	VA	Fluvanna County	5106502	
51	67	VA	Franklin County	5106702	
51	69	VA	Frederick County	5106902	
51	71	VA	Giles County	5107102	
51	73	VA	Gloucester County	5107302	
51	75	VA	Goochland County	5107502	
51	77	VA	Grayson County	5107702	
51	79	VA	Greene County	5107902	
51	81	VA	Greensville County	5108102	
51	83	VA	Halifax County	5108302	
51	85	VA	Hanover County	5108502	
51	87	VA	Henrico County	5108702	
51	89	VA	Henry County	5108902	
51	91	VA	Highland County	5109102	
51	93	VA	Isle of Wight County	5109302	
51	95	VA	James City County	5109502	
51	97	VA	King and Queen County	5109702	
51	99	VA	King George County	5109902	
51	101	VA	King William County	5110102	
51	103	VA	Lancaster County	5110302	
51	105	VA	Lee County	5110502	
51	107	VA	Loudoun County	5110702	
51	109	VA	Louisa County	5110902	
51	111	VA	Lunenburg County	5111102	
51	113	VA	Madison County	5111302	
51	115	VA	Mathews County	5111502	
51	117	VA	Mecklenburg County	5111702	
51	119	VA	Middlesex County	5111902	
51	121	VA	Montgomery County	5112102	
51	125	VA	Nelson County	5112502	
51	127	VA	New Kent County	5112702	
51	131	VA	Northampton County	5113102	
51	133	VA	Northumberland County	5113302	
51	135	VA	Nottoway County	5113502	
51	137	VA	Orange County	5113702	
51	139	VA	Page County	5113902	
51	141	VA	Patrick County	5114102	
51	143	VA	Pittsylvania County	5114302	
51	145	VA	Powhatan County	5114502	
51	147	VA	Prince Edward County	5114702	
51	149	VA	Prince George County	5114902	

Table A-8. Average Speed Distributions Provided by State, Local, and Tribal Agencies

State FIPS	County FIPS	State Abbreviation	County Name	Average Speed Distribution Base File Name	Provided Updates for 2005
51	153	VA	Prince William County	5115302	
51	155	VA	Pulaski County	5115502	
51	157	VA	Rappahannock County	5115702	
51	159	VA	Richmond County	5115902	
51	161	VA	Roanoke County	5116102	
51	163	VA	Rockbridge County	5116302	
51	165	VA	Rockingham County	5116502	
51	167	VA	Russell County	5116702	
51	169	VA	Scott County	5116902	
51	171	VA	Shenandoah County	5117102	
51	173	VA	Smyth County	5117302	
51	175	VA	Southampton County	5117502	
51	177	VA	Spotsylvania County	5117702	
51	179	VA	Stafford County	5117902	
51	181	VA	Surry County	5118102	
51	183	VA	Sussex County	5118302	
51	185	VA	Tazewell County	5118502	
51	187	VA	Warren County	5118702	
51	191	VA	Washington County	5119102	
51	193	VA	Westmoreland County	5119302	
51	195	VA	Wise County	5119502	
51	197	VA	Wythe County	5119702	
51	199	VA	York County	5119902	
51	510	VA	Alexandria city	5151002	
51	515	VA	Bedford city	5151502	
51	520	VA	Bristol city	5152002	
51	530	VA	Buena Vista city	5153002	
51	540	VA	Charlottesville city	5154002	
51	550	VA	Chesapeake city	5155002	
51	570	VA	Colonial Heights city	5157002	
51	580	VA	Covington city	5158002	
51	590	VA	Danville city	5159002	
51	595	VA	Emporia city	5159502	
51	600	VA	Fairfax city	5160002	
51	610	VA	Falls Church city	5161002	
51	620	VA	Franklin city	5162002	
51	630	VA	Fredericksburg city	5163002	
51	640	VA	Galax city	5164002	
51	650	VA	Hampton city	5165002	
51	660	VA	Harrisonburg city	5166002	
51	670	VA	Hopewell city	5167002	
51	678	VA	Lexington city	5167802	
51	680	VA	Lynchburg city	5168002	
51	683	VA	Manassas city	5168302	
51	685	VA	Manassas Park city	5168502	
51	690	VA	Martinsville city	5169002	
51	700	VA	Newport News city	5170002	
51	710	VA	Norfolk city	5171002	
51	720	VA	Norton city	5172002	
51	730	VA	Petersburg city	5173002	
51	735	VA	Poquoson city	5173502	

Table A-8. Average Speed Distributions Provided by State, Local, and Tribal Agencies

State FIPS	County FIPS	State Abbreviation	County Name	Average Speed Distribution Base File Name	Provided Updates for 2005
51	740	VA	Portsmouth city	5174002	
51	750	VA	Radford city	5175002	
51	760	VA	Richmond city	5176002	
51	770	VA	Roanoke city	5177002	
51	775	VA	Salem city	5177502	
51	790	VA	Staunton city	5179002	
51	800	VA	Suffolk city	5180002	
51	810	VA	Virginia Beach city	5181002	
51	820	VA	Waynesboro city	5182002	
51	830	VA	Williamsburg city	5183002	
51	840	VA	Winchester city	5184002	

All external file names use the base file name with extensions which identify which of the 12 HPMS roadway types that the speeds apply to. All file names have the form aabbbcc.ddd, where aa is the FIPS State, bbb is the FIPS county, cc is the last two digits of the calendar year and ddd indicates the HPMS roadway type.

Table A-9. Trip Length Distributions Provided by State, Local, and Tribal Agencies

State FIPS	County FIPS	State Abbreviation	County Name	Trip Length File Name	Provided Updates for 2005
11	1	DC	District of Columbia	1100105	✓
24	9	MD	Calvert County	2400002	
24	17	MD	Charles County	2400002	
24	21	MD	Frederick County	2400002	
24	31	MD	Montgomery County	2400002	
24	33	MD	Prince George's County	2400002	
48	39	TX	Brazoria County	4803902	
48	71	TX	Chambers County	4803902	
48	85	TX	Collin County	4808502	
48	113	TX	Dallas County	4811302	
48	121	TX	Denton County	4808502	
48	139	TX	Ellis County	4813902	
48	157	TX	FortBend County	4803902	
48	167	TX	Galveston County	4803902	
48	201	TX	Harris County	4803902	
48	213	TX	Henderson County	4813902	
48	221	TX	Hood County	4813902	
48	231	TX	Hunt County	4813902	
48	251	TX	Johnson County	4813902	
48	257	TX	Kaufman County	4813902	
48	291	TX	Liberty County	4803902	
48	339	TX	Montgomery County	4803902	
48	367	TX	Parker County	4813902	
48	397	TX	Rockwall County	4813902	
48	439	TX	Tarrant County	4811302	
48	473	TX	Waller County	4803902	
51	13	VA	Arlington County	5101305	✓
51	59	VA	Fairfax County	5101305	✓
51	107	VA	Loudoun County	5101305	✓
51	153	VA	Prince William County	5101305	✓
51	179	VA	Stafford County	5101305	✓
51	510	VA	Alexandria City	5101305	✓
51	600	VA	Fairfax City	5101305	✓
51	610	VA	Falls Church City	5101305	✓
51	683	VA	Manassas City	5101305	✓
51	685	VA	Manassas Park City	5101305	✓

All external file names use the file name extension WDT. All file names have the form aabbbcc.wdt, where aa is the FIPS State, bbb is the FIPS county and cc is the last two digits of the calendar year.

Table A-10. Vehicle Miles Traveled by Hour of the Day Distributions Provided by State, Local, and Tribal (S/L/T) Agencies

State FIPS	County FIPS	State Abbreviation	County Name	VMT by Hour File Name	Provided Updates for 2005
17	31	IL	Cook County	1703102	
17	43	IL	DuPage County	1703102	
17	89	IL	Kane County	1703102	
17	97	IL	Lake County	1703102	
17	111	IL	McHenry County	1703102	
17	119	IL	Madison County	1711902	
17	133	IL	Monroe County	1711902	
17	163	IL	St. Clair County	1711902	
17	197	IL	Will County	1703102	
36	1	NY	Albany County	3600102	
36	3	NY	Allegany County	3600302	
36	5	NY	Bronx County	3600502	
36	7	NY	Broome County	3600702	
36	9	NY	Cattaraugus County	3600302	
36	11	NY	Cayuga County	3600302	
36	13	NY	Chautauqua County	3600302	
36	15	NY	Chemung County	3601502	
36	17	NY	Chenango County	3600302	
36	19	NY	Clinton County	3600302	
36	21	NY	Columbia County	3600302	
36	23	NY	Cortland County	3600302	
36	25	NY	Delaware County	3600302	
36	27	NY	Dutchess County	3602702	
36	29	NY	Erie County	3602902	
36	31	NY	Essex County	3600302	
36	33	NY	Franklin County	3600302	
36	35	NY	Fulton County	3600302	
36	37	NY	Genesee County	3600302	
36	39	NY	Greene County	3600302	
36	41	NY	Hamilton County	3600302	
36	43	NY	Herkimer County	3600302	
36	45	NY	Jefferson County	3600302	
36	47	NY	Kings County	3604702	
36	49	NY	Lewis County	3600302	
36	51	NY	Livingston County	3600302	
36	53	NY	Madison County	3600302	
36	55	NY	Monroe County	3605502	
36	57	NY	Montgomery County	3600302	
36	59	NY	Nassau County	3605902	
36	61	NY	New York County	3606102	
36	63	NY	Niagara County	3606302	
36	65	NY	Oneida County	3606502	
36	67	NY	Onondaga County	3606702	
36	69	NY	Ontario County	3600302	
36	71	NY	Orange County	3607102	
36	73	NY	Orleans County	3600302	
36	75	NY	Oswego County	3600302	
36	77	NY	Otsego County	3600302	
36	79	NY	Putnam County	3607902	
36	81	NY	Queens County	3608102	

Table A-10. Vehicle Miles Traveled by Hour of the Day Distributions Provided by State, Local, and Tribal (S/L/T) Agencies

State FIPS	County FIPS	State Abbreviation	County Name	VMT by Hour File Name	Provided Updates for 2005
36	83	NY	Rensselaer County	3608302	
36	85	NY	Richmond County	3608502	
36	87	NY	Rockland County	3608702	
36	89	NY	St. Lawrence County	3600302	
36	91	NY	Saratoga County	3609102	
36	93	NY	Schenectady County	3609302	
36	95	NY	Schoharie County	3600302	
36	97	NY	Schuyler County	3600302	
36	99	NY	Seneca County	3600302	
36	101	NY	Steuben County	3600302	
36	103	NY	Suffolk County	3610302	
36	105	NY	Sullivan County	3600302	
36	107	NY	Tioga County	3600302	
36	109	NY	Tompkins County	3610902	
36	111	NY	Ulster County	3600302	
36	113	NY	Warren County	3611302	
36	115	NY	Washington County	3611502	
36	117	NY	Wayne County	3600302	
36	119	NY	Westchester County	3611902	
36	121	NY	Wyoming County	3600302	
36	123	NY	Yates County	3600302	
48	85	TX	Collin County	4808502	
48	113	TX	Dallas County	4808502	
48	121	TX	Denton County	4808502	
48	139	TX	Ellis County	4813902	
48	213	TX	Henderson County	4813902	
48	221	TX	Hood County	4813902	
48	231	TX	Hunt County	4813902	
48	251	TX	Johnson County	4813902	
48	257	TX	Kaufman County	4813902	
48	367	TX	Parker County	4813902	
48	397	TX	Rockwall County	4813902	
48	439	TX	Tarrant County	4808502	
49	11	UT	Davis County	4901105	✓
49	35	UT	Salt Lake County	4903505	✓
49	49	UT	Utah County	4904905	✓
49	57	UT	Weber County	4905705	✓

All external file names use the file name extension VMT. All file names have the form aabbbcc.vmt, where aa is the FIPS State, bbb is the FIPS county and cc is the last two digits of the calendar year.

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